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AREA DEVELOPMENT IN LIBERIA:
TOWARD INTEGRATION AND PARTICIPATION

A.I.D. Project Impact Evaluation No. 53

by

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FOREWORD

In October 1979, the Administrator of the Agency for International Development initiated an Agency wide ex-post evaluation system focusing on the impact of AID funded projects. These impact evaluations are concentrated in particular substantive areas as determined by A.I.D.'s most senior executives. The evaluations are to be performed largely by Agency personnel and result in a series of studies which, by virtue of their comparability in scope, will ensure cumulative findings of use to the Agency and the larger development community. This study of the impact of A.I.D. Area Development in Liberia: Toward Integration and Participation was conducted in January 1982 as part of this effort. A final evaluation report will summarize and analyze the results of all the studies in this sector, and relate them to program, policy and design requirements.

PREFACE

The members of this impact evaluation team are far more numerous than the five individuals whose names appear as authors of this report. All those with whom we have worked have viewed this exercise as a cooperative effort to understand the significance of the Bong and Lofa projects and to discover ways to improve or find alternatives to them. Our lives have been greatly enriched by the opportunity to meet, learn from, and work with all the members of this very large team. We think we have been very privileged to have had the opportunity to engage in an interdisciplinary study in cooperation with host country nationals instead of being obliged just to talk about the desirability of doing these things.

We cannot hope to acknowledge all the members of our "team," and some, as a courtesy and in their own interests, should remain anonymous. Happily, there are many to whom we can publicly express our appreciation. The Office of Evaluation deserves the credit for launching and continuing this series of impact evaluations. We are especially grateful to Dick Blue, David Steinberg, Twig Johnson, Cynthia Clapp-Wincek, Sandra Malone, Robin Galery, and Peggy Colbert for being so helpful, supportive, and patient in all phases of launching this exercise and bringing it to fruition. Jim Dawson, Dick Cobb, Hunt Howell, Donald Drayton, Emmy Simmons, and Roger Simmons were extremely helpful in providing insights on the country, the projects, and evaluation methodology. Dick Huesman made available the roster of the Board of International Food and Agricultural Development (BIFAD) consultants. Svend Holsoe provided the library resources and the hospitality of the Liberian Studies Institute to the team leader.

In Liberia, Ray Garufi, USAID director, and his colleagues Jack Cornelius, Bill Jadwin, and Curt Wolters provided indispensable assistance to the team in the field. Dr. Jeannette Carter of the University of Liberia shared her research and her field work experience with the team, spent hours helping us find research assistants, and generally lent moral support to us in our enterprise--for all of which we cannot thank her enough. Our senior interpreters/research assistants, Alfred Fayia and William Ndama, were our very able co-workers in the evaluation and are our permanent friends. Joseph Rattio was our very competent driver and enjoyable companion during our time up-country. Both project management teams were extremely helpful in providing insights and information concerning the projects, and patient in response to our never-ending questions. Their friendship and hospitality made our work load seem much lighter and more enjoyable.

Finally, we hope that the findings and recommendations of this project will in some measure prove helpful in the cause of promoting better standards of living in rural areas of the third world. In that way we hope in some small way to thank all the citizens of the Bong and Lofa project areas with whom we talked for sharing with us their experiences with and perceptions of the two projects.

SUMMARY

The Bong and Lofa Agricultural Development projects have been administratively successful as integrated rural development efforts but nevertheless have had limited positive socio-economic impact because they were founded on unrealistic economic and policy assumptions. These projects have been some of Liberia's most important efforts to diversify the economy and expand its base by engaging smallholders in the production of coffee, cocoa, and swamp rice. The projects have focused on 17,000 poor, rural households. On average they live in villages of under 200 persons, earn less than \$175 per capita per year, cultivate one to two hectares, have children who are frequently anemic, maintain marginally satisfactory nutritional levels, are not literate, and have suffered land tenure insecurity as a result of population pressures and the carving of individual plots by urban elites out of traditional clan patri-monies. Outmigration is very substantial.

The projects involved both planting of new and rehabilitation of old coffee and cocoa trees, and the restoring of old swamps as well as clearing new ones for rice cultivation. In addition, farmers were to be helped to improve upland rice productivity. Some 17,000 farm households and some 14,000 hectares have been included in these agricultural programs to date. In support of these agricultural objectives, the projects created units which monitored schistosomiasis extensively in the project areas, promoted and trained substantial numbers of both farmers and agricultural extension workers, built wells and latrines, attempted to strengthen old as well as establish new cooperative societies to market produce and administer credit programs, built and rehabilitated feeder roads, and established Project Management Units (PMU) to implement these activities. These PMUs were to be semi-autonomous vis-a-vis central ministries, particularly the Ministry of Agriculture. The units have shown dedication, imagination, and capability in implementing project activities, resolving internal problems, and adapting to circumstances unanticipated in the project designs.

The evaluation centered on finding answers to four questions. First, to what extent have households been offered attractive opportunities to participate in the implementation of the project and what has been the nature of the response? Farmers have limited and qualified their participation in the project-sponsored crop development programs because it is not clear to them that the risks, costs, and likely benefits involved point to significant financial returns over the long term. In the case of rice, farmers currently can achieve higher returns in the swamps by not participating in the project, given the loan repayment schedules, except in the few

cases where two crops a year can be harvested. Prices for coffee and cocoa have dipped sharply from highs reached at the time the projects began. It is still uncertain whether net financial returns to participating coffee and cocoa farmers will be higher or lower than those outside the project, given loan repayment schedules, input costs, and labor-intensive technology encouraged by the project. Households can gain the cash they need from coffee and cocoa production to meet social obligations without participating in the project. Keeping trees offers a firmer basis for claims to land than shifting cultivation in the case of upland rice. The most genuine farmer participation has been found in their de facto modification of project technical and financial packages by reducing expenses on inputs; e.g., using group labor in villages at below market wages, and reducing swamp acreage cultivated, mixing crop varieties, reducing the use of fertilizer and spreading it in ways that economize on labor. While seasonal loan repayment records are good, farmers have stretched out the repayment periods.

Second, what kinds of institution-building have occurred during the terms of the projects and how sustainable are these structures likely to be after the projects terminate? Both projects seek to establish village-level cooperatives, drawing upon traditional patterns of intermittent labor sharing to support them, in order to create a grass-roots base for the district cooperatives. The viability of this strategy is still in question. The district cooperatives are to be the heirs of the PMUs. Although their management capability has been strengthened and some improvements in leadership have been achieved in Lofa, these pre-existing cooperatives are not yet ready to shoulder all the responsibilities of the PMUs. In Bong, the district cooperatives are little more than extensions of the PMUs. The cooperatives have not yet made themselves indispensable to the farmers. Both farmers and the cooperatives themselves continue to rely almost exclusively upon middlemen for marketing, and there is little disposition on their part to change this practice.

Third, how are broad patterns of social change in the project area interacting with the project activities to affect the lives of the rural poor? Population/land ratios are increasing, with predictable effects on land tenure security. Women's assertion of claims to personal plots within the context of farm households portends changes of great magnitude in household organization and the patrilineal basis of social organization. The projects have left ambiguous what their focus on individuals as distinct from households should be. Road building has greatly transformed the lives of the rural poor in Bong and Lofa, and the participants themselves see such road building as perhaps the most enduring and important consequence of the projects. Environmental change, intensified by

the projects' activities, points to the need to focus more comprehensively on the ways in which agricultural production, nutrition, and water contact practices bear upon each other. The focus on schistosomiasis monitoring and latrine and well building in the projects per se does not extend to shaping these basic relationships.

Fourth, how have external factors affected the projects? The Ministry of Public Works has not fulfilled its road building responsibilities, funding from the Agricultural and Cooperative Development Bank has not been adequate, and the Cooperative Development Authority has given more encouragement to creating and splintering of cooperatives than to making them financially viable local institutions. The absence to date of a post-coup land policy has delayed solution of locally experienced land tenure insecurity, and so tenure insecurity remains a problem.

The conclusions are that the development model is administratively sound, particularly given the PMUs' skill in coping with unforeseen circumstances. The rationale for farm household participation in the projects' economic programs is dubious except for the upland rice seed exchange program. The major difficulty with the project is the absence of any provision to do formally and comprehensively the kind of mid-course redesign work the PMUs have done informally within existing limits. Such redesign work needs to take into account, inter alia, commodity price fluctuations in relationship to loan repayment schedules and other costs. In addition, redesign work should take into account the absence of a strong ongoing agricultural research program based on the Central Agricultural Research Institute, the existence of which was initially erroneously assumed. Though the project units have been semi-autonomous, their impact has been diminished by unresolved national-level problems: bureaucratic inefficiency, inadequate crop finance, and unrevised policies on land and cooperatives.

The lessons learned from these projects are the following: (1) flexibility should be provided for mid-course redesign of any and all aspects of comprehensive projects; (2) in their early stages, projects should emphasize testing of and experimentation with proposed technical packages as well as implementation; (3) decentralized area projects are viable given requisite national policy and administrative support; (4) participation by farmers is directly a function of the organization's capability to fashion programs that in fact and appearance appeal to farmers' material interest; (5) decentralized area projects should in fact be integrated, including relations between central government and project staff, linkages among donors, and project activities within and among sectors; and (6) locally based agricultural research, closely tied to the use of extension workers and involvement of farmers themselves, is essential for agricultural development projects.

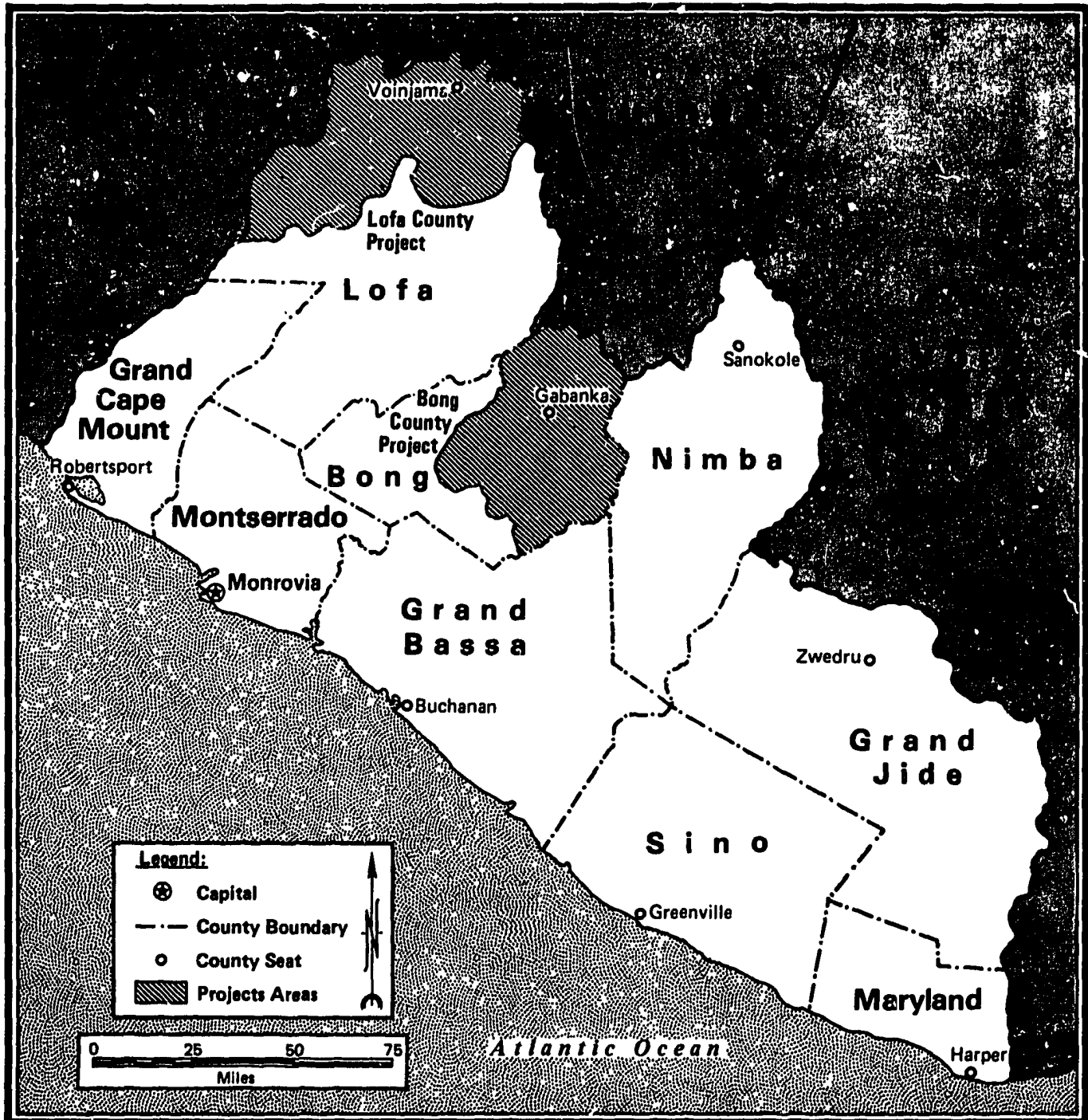
PROJECT DATA SHEET

	<u>Lora County</u>	<u>Bong County</u>
Country:	Liberia	Liberia
Project Title:	Lofa County Agricultural Development Project	Bong County Agricultural Project
Project Number:	669-0142	669-0139
Project Start:	1976	1977
Phase I Completion:	1981	1982
Project Funding:	\$18,000,000	\$20,300,000
Project Purposes:	"To increase agricultural production and productivity in Upper Lofa County, primarily on small farms"	"To increase and maintain agricultural productivity and income of small farmers in Upper Bong County"
Est. No. of Households:	10,000	7,000
Cost per Household:	\$1,800	\$2,900
Est. Area Developed:	9,500 hectares	4,500 hectares
Cost per Hectare:	\$1,900	\$4,500
Wells Constructed:	195	
Latrines:		78
Feeder Roads (Project):	361 miles	90 miles
Feeder Roads (Ministry):	257 miles	40 miles
Schistosomiasis Area Surveyed:	609 hectares	
Schistosomiasis Stool Samples:	19,632	
Schistosomiasis Urine Samples:	28,546	
Staff Trained:	465	
Farmers Trained:	7,970	
Credit Disbursed (Seasonal):	\$60,000	\$49,000
Credit Disbursed (Development):	\$326,000	\$832,000
Currency:	The U.S. dollar is legal tender in Liberia.	

GLOSSARY

ACDB	Agriculture and Cooperative Development Bank
BCADP	Bong County Agricultural Development Project
CARI	Central Agricultural Research Institute
CDA	Cooperative Development Authority
FTC	Farmers Training Center
<u>kuu</u>	Traditional, intermittent custom of cooperation in work
GOL	Government of Liberia
LCADP	Lofa County Agricultural Development Project
LPMC	Liberia Produce Marketing Corporation
MOA	Ministry of Agriculture
OAU	Organization of African Unity
PMU	Project Management Unit
<u>poro</u>	Traditional secret societies (male membership)
MOH	Ministry of Health
PRC	People's Redemption Council (Military Government of Liberia)
PSC	Project Steering Committee
<u>sande</u>	Traditional secret societies (female membership)
RDI	Rural Development Institute
SSU	Schistosomiasis Surveillance Unit
TCU	Town Cooperative Unit
UNDP	United Nations Development Program
USAID	U.S. Agency for International Development
WARDA	West Africa Rice Development Association

Liberia



I. INTRODUCTION

The Agency for International Development (AID), the World Bank, and the Government of Liberia collaborated in forming two large-scale, multisectoral agricultural development projects in Liberia. The Lofa County project began in 1976 and the Bong project in 1978. Using semi-autonomous Project Management Units (PMU) the two projects were designed to improve incomes, productivity, and standards of living for poor, rural Liberians who had been essentially spectators to what development the country had previously achieved. This report assesses the impact of these projects on the lives of the intended beneficiaries. This study places the projects in the setting of Liberia's pattern of development. It then assesses the projects' sustainable, positive impacts in terms of the key issues of participation, institution-building, patterns of social change, and the effects of external factors.

II. PROJECT SETTING

Liberia's once moderately healthy economy and stable political order now stand seriously undermined. Once buoyed by the earnings of an export-oriented enclave consisting primarily of rubber, iron mining, and timber ventures, Liberia's economy has recently sunk precipitously because world prices for these exports have plummeted dramatically in recent years. Broadening of the country's economic base through promotion of agricultural exports has been encouraged, but the prices of the principal agricultural exports (coffee and cocoa) have also declined sharply from the high levels of the late 1970s. Meanwhile, the prices and volume of imports have continued to grow, although in some cases at a diminished rate. Of particular importance to this study is the country's growing dependence upon the importation of rice to feed not only the urban population but also a significant proportion of rural households for whom rice is the traditional, staple subsistence crop.

Meanwhile, discontent arising from a decade of increasingly overt official corruption, overlaying more than a century of political and economic domination by a small community of urban Liberians, boiled over in the April 1980 coup that brought Master Sgt. Samuel K. Doe to power. The coup was heralded almost exactly a year earlier by serious riots prompted by a proposed increase in the official price of rice. The Government required the assistance of troops from Guinea to re-establish its authority. The country's political crisis was foretold by a mammoth increase in public expenditures between 1975 and 1979. A large proportion of these increased expenditures was the tangible result of increasingly overt official

corruption which over time tended to be more explicit and unabashed under Tolbert than during the Tubman years, at least in the eyes of some Liberians.

The People's Redemption Council (PRC), which Doe heads as Commander-in-Chief, has proved able to do very little in its first two years to realize the promises symbolized by its name: increased popular participation in the political and economic life of the country and restoration of more honest and dedicated rule. Indeed, high-level personnel in the new administration itself have conceded that bribery has become more prevalent instead of receding, and management of the public sector has become more rather than less inept, notwithstanding the efforts of numerous individuals. Diminished investment in the country's economic future by the business community, domestic and foreign, has both reflected and reinforced the country's drift away from rather than progress toward solid economic and political moorings. The magnitude of the crisis is dramatized by the nearly \$60 million grant the United States felt obliged to give the Government of Liberia during 1981 simply to meet monthly payrolls.

The roots of the country's present economic and political distress have been recognized for more than a decade by individuals within the Government as well as by the international development community. Official campaigns have been launched to strengthen the country's economy. Although some progress has been made, the overall results have not been encouraging. First, although significant growth occurred in the agricultural sector, the Tubman and Tolbert regimes both proved largely ineffective in promoting diversification of the enclave-based economy. Their regimes did little to increase reliance upon local and regional markets as a means of cushioning the impact of fluctuating prices in the international markets. Despite a series of campaigns to promote broadened and intensified participation in rural economic development, 62.6 percent of the country's employed persons in 1978 continued to find livelihoods primarily in subsistence agriculture plus marginal participation in commercial agriculture--a substantial percentage though not¹ unusually large by lesser developed country (LDC) standards.

Second, Government deficit spending spiraled dizzily from \$7.8 million in 1975 to \$170 million in 1980, much of the increase the result of corrupt and unproductive spending on enlarged payrolls and inflated salaries, public corporations, and the hosting of the 1979 OAU conference. Excessively centralized direction of ministries, unmitigated by achievement of

¹International Monetary Fund data, 1980.

potential benefits in coordination, continued to hamper the effectiveness of the public sector for legitimate activities.

Third, the country has yet to evolve a strategy for diminishing its dependence upon world markets, with all their vagaries, for capital and consumer goods. For example, the regime's stated objective of rice self-sufficiency, if taken at face value, is widely regarded as impractical and uneconomic on grounds of comparative advantage.² Hence the dualism characteristic of the Liberian economy continues. On the one hand, urban consumers justifiably rely upon imported rather than domestically produced rice. On the other hand, small-scale farmers produce coffee and cocoa for export and rice for their own subsistence and for intermittent and limited sales at a very local level. They do not effectively enjoy a third option, of producing in a major way for domestic and regional commercial markets. This dualism and the absence of any "third option" will continue as long as (1) exploration for alternative products that Liberia can offer is insufficient or inefficiently undertaken; and (2) existing transport infrastructure and marketing patterns pass on the costs of their inefficiency to the small farmers dependent upon them.³

Liberia has sought to diminish and de-emphasize its dependence upon the United States for trade and aid, but the special relationship between the two countries is still evident, for example, in the enclave industries and the reliance upon the U.S. dollar as the official currency. The recent budget support by the United States illustrates another dimension of that relationship: a special U.S. obligation to Liberia that historically has guided U.S. policy since the Republic's inception as a home for repatriated American slaves.

No one has yet evolved a development strategy which addresses successfully the question of how, with reasonable hope and at acceptable risk, Liberia might begin to mitigate these underlying problems. A basic question of this study is whether the Lofa and Bong County Agricultural Development Projects (LCADP and BCADP) have represented a model which might become

²See, for example, Eric Monke, "Rice Policy in Liberia" (pp. 110-140) and "Economics of Rice in Liberia" (pp. 142-171) in S. Pearson, J.D. Stryker, and C.P. Humphreys, Rice in West Africa: Policy and Economics (Stanford University Press, 1981).

³It is worth observing that the law of comparative advantage states not only that less efficient producers should yield to more efficient ones but that a producer less efficient than his competitor in all products should still produce that which he does most efficiently.

the basis or an element of such a strategy--with appropriate refashioning and lowered costs in replication.

The Lofa and Bong projects were conceived as means of promoting the well-being of the rural poor by counteracting at the grass roots the country's fundamental problems of narrowly based productivity, Government inefficiency, and economic dependency. The people of Bong and Lofa Counties are among those who (at least until recently) have been spectators more than participants in the country's narrowly based economic development. The spectator role itself has become increasingly untenable. Rice consumption levels appear to have risen on a per capita basis for reasons that are poorly understood, but the ability of rural households to produce enough rice for their own subsistence has declined. Given increased dependence of rural households upon the cash economy, many have responded by migrating to the cities in search of more lucrative wage employment.

Rural households in Bong and Lofa are among the majority who were poorly served (at least prior to the projects) by ministries responsible for establishing road networks, promoting health and literacy, and improving agricultural production. On average, rural Liberian incomes have reached no more than 60 percent of the national annual per capita income of \$520 (estimated).⁴ They fall predominantly within the 60 percent of the workforce that collectively receives a mere 15.6 percent of the national income. The great majority of the rural households--including those in the project area--cultivate no more than five hectares. Poor road conditions and the absence of effective preventive health care programs are reflected, inter alia, in the estimated 60 percent of all children under five who are anemic and the 18 percent whose growth is stunted.⁵ Calorie and protein levels are only marginally satisfactory by internationally defined standards. The combination of environmental change and continuity in water contact practices encourages disease transmission that undermines rural health. The corollary is the diminished ability of rural households to make the fullest use of scarce labor resources. Land tenure insecurity has increasingly been a problem due to population/land ratios which are no longer as favorable in many areas as they once were. Such insecurity also has resulted from urban elites carving freehold tenure plots out of lands historically treated as a national patrimony and at least nominally reserved to clan stewardship. It may be significant that in July 1981 the PRC

⁴IBRD World Development Report, 1981.

⁵Government of Liberia, Ministry of Economic Planning, Economic Survey, 1980.

quietly lifted the freeze on land transactions it imposed shortly after it came to power.

One of the most important indicators of the overall poverty in rural Liberia has been a history of substantial outmigration from Bong and Lofa as well as the other rural counties of the country. As has been the case elsewhere, such migration is heavily concentrated among males and among the young.

Rural Liberians are villagers; approximately 64 percent of the population resides in communities of under 200 people.⁶ Villages represent the base of a three-tiered hierarchy of chiefs. They are the focal point of a traditional community of labor for clearing and harvesting through the institution of kuu, a customary practice of ad hoc and informal cooperation for specific purposes. Upon this tradition of cooperation both projects seek to erect an edifice of district-level cooperative societies to promote both access to and efficiency in marketing and agricultural input distribution.

But there are important limitations to the extent of cooperation at the village level, some of the most significant of which concern land tenure. On the one hand, individual households possess land; villages do not hold land in common. On the other hand, within households there is evidence that the one or more wives of individual household heads have begun to establish claims to "personal" plots not subject to the supervision of their husbands. Often such plots are found in swamps where men are reluctant to cultivate rice because of the presence of leeches and sources of schistosomiasis infection. Women appear ready to accept these hazards in order to gain better access to land.

There are processes at work which both encourage and restrain individualization of land holdings. On the one hand, money from sales is held individually rather than collectively within households. Particularly in Bong, the "persuasion" of local chiefs to accept individual private holdings in traditional clan domains nominally protected by national legislation may have moved household heads to increase their sense of land tenure security by deeding "individual" holdings to their wives. The extent and statutory significance of such deeding remains, however, highly questionable. On the other hand, customary inheritance patterns and responsibilities for the care of children may limit the significance of such individualization of land holdings.⁷ A constitutional commission

⁶IBRD. The IBRD World Development Report 1981 estimate is 68 percent.

⁷See Appendix F by Svend Holsoe.

presently at work is considering such measures as limiting the size of holdings, registering clan-held lands, and imposing development conditions on those holding individual freehold titles.

More generally, an apparent deep and far-reaching reservoir of intergroup distrust impedes the task of promoting cooperation in the interests of rural development, distrust reflected in part in land tenure relationships. This is particularly the case in Lofa where five distinct ethnic communities retain a strong sense of their respective cultural identities. For example, the team learned indirectly after its farm-level interviews in Lofa that even though our respondents fully understood what we said were the reasons for our visit, they nevertheless wondered if we had really come to assert a claim to their lands. One village group we spoke with, apparently expecting that we would offer some token of appreciation for their granting us an interview, resolved among themselves during the interview that they would accept no such gratuities. They apparently feared that to do so would be taken by us as compensation for access to their lands. How much greater must be the distrust in Bong where the loss of land to "big men" from Monrovia has been so much more extensive than in Lofa!

The increasing land scarcity resulting from steady population growth can only intensify distrust stimulated by land tenure insecurity. In the absence of effective policies to reform and regularize land tenure practices, villagers may be taking matters into their own hands while undertaking project-supported agricultural development. One reason that villagers have chosen to plant new coffee and cocoa trees is that such "permanent" tree crops represent a more secure claim to land than does shifting rice cultivation. A certain level of insecurity and distrust may induce entrepreneurial initiative, but beyond a certain point it can also lead to profound and destructive social disintegration. The objectives of rural development in areas such as Bong and Lofa must be to recognize villagers' motivations for what they are and, through such measures as land reform, channel them toward developmental objectives rather than allow the chaos that might otherwise occur.

An underlying, fundamental question is who will be the eventual legatees of contemporary efforts to promote rural development in areas like Lofa and Bong and on what terms. Both projects now concentrate their resources and energies on an aging population of farmers. These farmers give clear evidence of their ability to sort out the risks, costs, and potential benefits of the farm budgets and agricultural packages presented to them under the projects. A cautious and limited response by farmers to such project offerings may represent a sense that anticipated earnings do not justify the indebtedness

and risk of failure involved. Alternatively, the risks may only be acceptable to farmers with accumulated resources of their own who may fall outside the ranks of the rural poor whom the projects were supposed to assist. However, some argued to the team that these older cultivators simply are too rooted in their own traditions to harbor more than limited interest in the expanded economic opportunities potentially offered by cash crop farming. For such individuals cash may be valued simply to meet immediate, intermittent, and finite obligations. Tree crops may represent more an inheritance to be passed on to the next generation than a source of growing cash income in the short and medium term. The real question may be, therefore, whether projects like Lofa and Bong can evolve new styles of farming which will present an attractive challenge to better educated rural young people who tend to venture off to an uncertain economic future in the mines, the plantations, or Monrovia. To what extent can the projects present opportunities to older farmers that will cause them to want to make an investment in a more commercial agricultural future attractive to their progeny?

III. THE PROJECTS

The goals, purposes, outputs, and strategies of the two projects have been broadly similar but not precisely identical. Both projects have sought to improve the well-being of farmers through changes in agricultural production and productivity. To this end, the project development strategies have included (1) improvement in upland rice production and productivity; (2) rehabilitation of old and development of new swamp rice acreage; (3) rehabilitation of existing and planting of new coffee and cocoa trees; (4) improvement of inherited and construction of new feeder roads in conjunction with the Ministry of Public Works; (5) training of agricultural extension personnel and of farmers themselves; (6) improvement in social infrastructure and services through construction of wells, latrines, and the establishment of schistosomiasis surveillance units; (7) strengthening of existing cooperative societies in Lofa and the inauguration of new ones in Bong; and (8) the establishment of PMUs in Voinjama and Suakoko to monitor and implement the several facets of the Lofa and Bong projects, respectively. Though no formal linkages were provided, agricultural research support through the Central Agricultural Research Institute (CARI) at Suakoko was also an important dimension.

At the goal level, it remains unclear to what extent and on what terms a concept (or concepts) of integrated rural development was to guide the implementation of the projects. The term appears in the USAID project documentation but the

World Bank, co-financers of the projects along with the Government of Liberia, have designated them as agricultural development projects--the appellation by which they are known locally. There was, in any event, very little specific attention paid in the project documentation to how such integration was to be defined and achieved--if that was a conscious goal.

The major difference in the specific indicators of project success fell in the controversial area of how far it would be possible and practical to increase the productivity of upland rice cultivation. The Lofa project anticipated a 70-percent rise based on changes in the use of LAC-23 plus changes in cultivation practices, compared to the 30 percent projected for Bong resulting solely from the use of LAC-23.

The projects introduced agricultural credit and improved seed varieties to small farmers in Bong and Lofa virtually for the first time. The principal seed varieties propagated were LAC-23 for upland rice and IR-5 and Suakoko-8 for swamp rice. IR-5 was developed under the auspices of the International Rice Research Institute and tested in Liberia as well as in wide areas of Asia.

The projects provided both development and seasonal credit. Development loans were to be used for tools; land clearing equipment in the case of swamp rice; and tools, sprayers, seedlings, chemicals, and fertilizers for new coffee and cocoa development. These loans bore a 10-percent interest rate on the unpaid balance and were repayable in 12 years after a 4-year grace period in the case of coffee and cocoa (8 years for coffee at Lofa). Swamp rice development loans were issued at 10 percent, payable after each harvest. They were to be used for seeds and fertilizers in the case of upland and swamp rice and for tools, chemicals, fertilizer, and sprayers in the case of coffee and cocoa.⁸ All such loans were issued contingent upon acceptance of project technical advice and the use of cooperatives for marketing. The loans were to be channeled to farmers through the cooperative societies under project supervision. One portion of the interest was to be retained as commission by cooperatives and another was to go to a revolving credit fund to provide for farmers' future credit requirements.⁹ Marketing of farm produce was to take place through the Liberia Produce Marketing Corporation (LPMC) whose crop

⁸Coffee and cocoa rehabilitation loans were issued in Lofa. Development loans were used for water control and storage at Bong. Seasonal credit was issued for processing equipment in Bong.

⁹See Appendix B by Annette Binnendijk.

purchase payments to the cooperatives were to include a commission for assembling and grading crops and a transportation allowance varying with the distance of the cooperative from the LPMC depot.

After an initial period in which the distribution of inputs and marketing of produce were to be handled by the PMUs, the cooperatives were to assume these responsibilities. Specific designation of the cooperatives as the heirs of the PMUs' work and explicit strategies for devolving increasing responsibilities upon the cooperatives were not formally set forth in the project documentation. In Lofa, four cooperatives had been in operation prior to the inauguration of the project, while in Bong new cooperatives were to be established. In Bong, unlike Lofa, a federation of district cooperatives was to be created which would be primarily responsible for the marketing and input distribution functions. In each case, the projects assumed the importance of creating town cooperative units for local assembly of agricultural produce, units which might or might not be able to draw in fact or by analogy upon the tradition of kuu at the village level.

The PMUs were to be semi-autonomous from the regular ministries in the interests of better coordination and more decentralized implementation. The units, however, were to cooperate with the relevant ministries in establishing the schistosomiasis surveillance units (SSUs) and the staff and farmer training institutes, and in particular for the construction and maintenance of feeder roads. How ministries and local organizations such as the cooperatives were to share post-project responsibility for these activities was not specified in the project documentation. The Lofa project, especially, anticipated that the training of extension staff would exceed project requirements so that those who trained and gained experience at Lofa could move to other rural areas, including Bong, and diffuse the expertise they gained. How ethnic factors would bear upon this strategy was not articulated.

The project designs included clear, important assumptions concerning the contributions of village-level cooperatives and the Ministry of Public Works, the financial solvency of the LPMC, and the general administrative support of the Government of Liberia. None of these assumptions proved realistic. The projects assumed stable prices for project crops, the availability of ample and reasonably priced labor, the receptivity of farmers to the agronomic packages and the farm budgets as proposed or modified, the security of land tenure, and research support from CARI. Less clearly articulated in the project documentation were the important differences in the project environments: Bong's proximity to greater employment and marketing opportunities in Monrovia; the task of creating new

cooperatives as distinct from improving old ones; Bong's proximity to CARI and the Rural Development Institute (RDI) connected to Cuttington University College; and differences in population pressure, rainfall, and soil conditions in the two project areas.

IV. FINDINGS AND ANALYSIS

The results of the projects and their likely impact over the long term on the lives of the people of Lofa and Bong Counties hinge on answers to four fundamental questions:

1. To what extent have the projects offered households, given the socioeconomic pressures upon them, attractive opportunities to participate in the implementation of the project, and what has been the nature of the response?
2. What kinds of institution-building have occurred during the terms of the projects, and how sustainable are these structures likely to be after the projects terminate?
3. What broad contours of social change have emerged in rural Liberia, in the project areas in particular, whose interaction with project activities are likely to change fundamentally the lives of the rural poor?
4. To what extent and in what ways have the projects mitigated or been victimized by the long-term weaknesses of the Liberian political and economic order, and with what consequences for the long-term impact of the projects?

A. Participation in Implementation

The elements of participation include involvement by intended recipients of development assistance in decision-making, implementation, benefits, and evaluation.¹⁰ In the circumstances of these projects, processes of participation etched the following model at the village level: first, implementation initiatives by the PMUs yielding initial acceptance by people of principal features of the projects--credit and agricultural packages and membership in the cooperatives; second,

¹⁰Uphoff, Cohen, and Goldsmith, 1979.

subsequent evaluation of these project inputs, both by the PMUs and by the farmers; and third, formal and informal redesigning of the project as necessary and possible.

1. Implementation

In simple arithmetic terms both projects have made significant strides in promoting the utilization of scheduled inputs by low-resource households (see Project Data Sheet). The project teams have gotten the attention of the intended beneficiaries: farmers struggling to produce enough rice for their subsistence and a little cash for emergencies and necessities. Despite problems with the definition of categories and the comparability of some of the data, it is evident that more than 17,000 households have accepted, at least initially, the terms of the two projects in the five years one or both have been in progress. Nearly 14,000 hectares of land have been devoted to crop improvement, rehabilitation, and production increases. On a per capita basis, the amounts of land involved have been fairly small.

A serious campaign has been launched by both projects to support the objective of increased productivity on the part of small-scale farmers. A substantial number of extension aides have been trained, particularly in Lofa, to oversee delivery of credit packages that were almost completely unavailable to these farmers before the projects began. Many people have been tested for schistosomiasis, and wells and latrines have been constructed in an effort to improve water use practices and the health of the rural poor. In Bong, the PMU has surveyed large-scale private holds of prerevolutionary elites preparatory to dividing them into small plots for allocation to project farmers.¹¹ Feeder roads have been constructed, both projects having met their own targets and done some of the maintenance work that was to have been undertaken with project funds by the Ministry of Public Works.

Finally, training and technical assistance programs have reached nearly 400 staff and almost 5,000 individuals. The projects have engaged in such training and knowledge dissemination without benefit of requisite research support focused on

¹¹In the absence of either an injunction or positive encouragement from the new Government, the Bong project has gone ahead with the subdivision and allocation of these holdings of former "big men." Some of these large holdings have been left untouched. It remains unclear who decides which ones to take over and which ones to leave alone.

formulating locally appropriate agricultural technologies, suitable farm budgets (i.e., scheduled costs and anticipated incomes for farm households), effective modes of technical assistance, or creating institutions for mobilizing the productive energies of the poor.¹² The Central Agricultural Research Institute (CARI) and the Rural Development Institute (RDI) at Suakoko have only quite recently begun to explore means of pooling the knowledge of their technical personnel and the experience of farmers in projects like Lofa and Bong (which is located in the immediate vicinity of Suakoko!).

There have been significant investments by the project teams in expanding the membership of cooperatives or beginning new ones at the regional level. The teams have sought to base these organizations on village-level cooperation. They have done this by establishing town cooperative units which appear to be linked in some cases to traditional albeit intermittent patterns of cooperation known as kuu. The objectives of the PMUs have been to strengthen the ability of cooperatives to market produce, distribute inputs, and manage credit and loan repayments.

The PMUs have promoted the cooperatives without benefit of previous or even much current inquiry into what sorts of structures villagers would find most legitimate and useful in terms of existing social structure. Designers and implementers alike have assumed the merits of western models of cooperative society structures and policies for guiding them, without benefit of empirical testing or other preproject inquiry. Both project management teams recognize the need for more work on cooperative society models as do senior officials in the Ministries of Planning and Agriculture. One proposal is that the RDI might be suitable for more intensive research into the uses and forms of cooperatives. It is possible that the new Government of Liberia may at some point rethink its existing cooperative society statutes.

Within the existing statutory and policy framework, the Lofa project has worked extensively with existing cooperatives to increase their management capacity and diminish the extent of mismanagement. The PMUs have achieved sufficient rapport with town cooperative units that through them they have been able to instigate leadership changes in two instances in the district cooperatives. Thus, these district cooperatives have been able to rid themselves of inherited leaders who saw the cooperatives' resources as their personal capital development

¹²The former project manager explains that some 15,000 seed varieties had been tested prior to the projects, but the whereabouts of that research remains unknown.

funds. Although the projects continue to subsidize key staff people in the district cooperatives and instances of financial mismanagement continue to occur, the projects do seem to have made progress in improving the organizations' managerial efficiency. However, fundamental problems with the cooperative society structure remain (see Section IV.B on institution-building).

2. Evaluation and Decision-Making

If the PMUs have captured the attention of the rural poor in Lofa and Bong and formally engaged them in the projects, the technical agricultural and financial packages have proven not to be fully consonant with the material interests of the farm households, where material interests are defined in political, cultural, and social, as well as specifically economic, terms. One reason is that the project has in effect placed a disproportionate share of the risks upon farmers with little capital or labor and decreasing amounts of land to risk. Some households, therefore, which are nominally a part of the project have participated in it less than fully. To the extent that the project has not appealed to the material interests of the poor, the project may not be sustainable in the long term.¹³

At the same time, where participants have in fact responded positively to the incentives created by the projects, they have in some instances done so for reasons quite different from those of the project designers. To the extent that the poor have participated actively for reasons not understood by the project designers, the project may eventually be undermined for failure to anticipate the problems and objectives the farmers themselves see.

The story of project swamp rice development provides a prime illustration of an unsuccessful and improperly designed attempt to shift all the risk to the farmer participants. Farmers in the projects have complained of insufficient resources to hire labor needed to maintain swamp rice development, and they have objected to risking schistosomiasis and other maladies by farming in these precincts. They disagree with the Ministry of Agriculture officials who discount the importance of credit to hire laborers to maintain the banks and the canals, and the health hazards of undertaking swamp rice. It is the swamp rice farmers themselves, however, and not project or ministry officials, who take the risk that they will be unable

¹³See Appendix B by Annette Binnendijk on the farm-level project economics.

to meet their financial obligations under the project for lack of more attention to these problems. Except where population pressure on upland rice areas has driven farmers--particularly women who have no other access to land--into swamp rice development, as in parts of Lofa, farmers have tended to restrict their participation in project-supported swamp rice development. This tendency is particularly noticeable at the point when the grace period on loan repayment is about to expire. Other "external" factors such as the effects of the coup may also have discouraged fuller participation in the projects.

The "rationality" of the farmers' response is supported by calculations of net returns per person day, assuming either the old rice price of \$0.12 per pound, the recently announced \$0.18 price, or shadow prices. On the assumption of one crop per year under project auspices, cultivators can achieve higher returns either by cultivating swamps outside the project--without the financial risks of participation in the project--or by investing in the upland seed exchange program where higher returns can be achieved for more limited investments of capital and labor. Only in the less-than-universal case where water availability permits two crops does project swamp rice approach--not necessarily surpass--the returns available from the other forms of rice cultivation.¹⁴

Project coffee and cocoa development illustrates both the doubtful economic rationality of farmers participating actively in the project and, where it occurs, the impact of problems outside the purview of the project. Prices obtained for coffee and cocoa have declined sharply from the peaks they reached briefly at the time many farmers were electing to join the projects' tree planting programs. While one village was so disgusted by this turn of events that its citizens proclaimed to the team their intention of burning the trees, most farmers have appeared to react more cautiously to these price trends. Even so, some blame the price declines on the "World Bank projects" (the name by which they are known locally to the farmers). Some, however, remember that the high prices of the late 1970s were the exception rather than the historical rule.

The combined effects of price changes and loan repayment schedules on the economics of small farmer participation in the tree crop planting program reinforce the broader, cultural reasons for limited farmer involvement with the project. Tree crops serve both long-term and short-term economic interests for rural households. On the one hand, tree crops serve villagers' long-term interests by securing their claims to given

¹⁴See Appendix B for more detail.

plots of land more or less in perpetuity, where shifting cultivation does not. In the absence of clear land tenure rules providing security of occupation, tree crops establish effective de facto "squatters' rights" in the eyes of local inhabitants. Farm households also appear to consider their tree crop plantings as inheritances to be bequeathed to their children. Such tree crops are also a source of quick cash to meet a variety of immediate needs, e.g., secret society (poro and sande) obligations, school fees, burial and marriage costs, and food purchases. Thus, the farmers have good reason to participate, but not necessarily to become thriving cash crop farmers.

At the same time, the cultivators have little basis for determining whether the risk of engaging in the tree crop program in a big way is worth taking for any of the foregoing reasons. At the moment the returns to the farmer are much higher for nonproject coffee and cocoa, partly because many of these trees are nearer to maturity than those planted under the project. Neither project staff nor farmers can be sure whether yields from project trees will be sufficiently higher than nonproject trees to justify their investment in increasingly costly labor and still enable them to meet eventual loan repayment obligations--particularly if prices do not increase or if they decline further. The project thus presents a different set of risks to the farmers than the traditional middlemen do--higher returns now and the possibility of lower returns later rather than the reverse. Such analysis is complicated further by such crucial technical questions as how to derive a shadow price for a farmer's own household labor--and how farmers themselves value their own and their families' labor. The eventual economic outcome is also clouded by such administrative and political problems as the gaining of waivers to use non-U.S. fertilizers in the project.

The conclusion is that participation in project-supported crop development programs may not be sustainable without mid-course redesign work that takes account of (1) the full range of the participants' interests and (2) the changing economics of farmer involvement caused by price changes. The heart of the problem lies neither in any lack of farmer interest nor in the effectiveness of the PMUs but in the absence of provision for more effective pre- and mid-course project design work. The PMUs, particularly in Lofa, have shown a willingness and capacity to reshape the project in dialogue with the participants. But they have been limited by lack of provision in project agreements for change and limited resources for making alterations. The importance of provision for mid-course redesign is directly proportional to the poverty of the participants and their financial obligations under projects. The greater these obligations, relative to participants' own resources, the more redesign work is required to maintain levels of financial risk to participants that are appropriate to their reserves.

The most genuine farmer participation in the projects' agricultural programs has occurred in the villages and in the farm households themselves. Farmers have done their own "project redesign" work in order to bring financial risks into line with likely benefits as they perceive them. Their response to perceived limited returns from adopting project packages has been to trim the costs of inputs through such tactics as reducing the use of fertilizer, group payments for hired labor below the market price for the individual hired hands whom the projects supposed would be employed, opting for cocoa because it is less labor intensive than coffee, less intensive brushing of trees than recommended (or even nonmaintenance of trees), and reduction in the scope of swamp rice acreage. Farmers have experimented with the amount of fertilizer, adjusted the balance between traditional and newly introduced varieties, grown alternative crops such as cassava, and broadcast swamp rice seeds rather than transplanting them--again, mostly to save on labor costs. Finally, while farmers have demonstrated willingness to repay seasonal and development loans, they have informally stretched out the repayment period to take account of their financial circumstances.

Limited use of project inputs must not be confused with lack of small farmer enterprise and initiative. For example, the team visited the farm of a high-school educated taxi driver from Monrovia who had decided to return to Lofa because he found only a rural lifestyle satisfying. Largely through his own efforts and those of his brothers and sisters, he had developed more than three hectares of swamp rice, installed his own aquaculture program, and laid plans to begin cocoa tree planting. His commitment to rural living was striking particularly because his education and experience with urban living had propelled him toward rather than away from participation in rural development. We could not know whether he had savings from his urban employment that gave him a greater financial cushion than enjoyed by his neighbors. However, like his neighbors, he also limited the use of hired labor by relying almost entirely on his own family and planning to plant cocoa rather than coffee.

The PMUs have done a great deal within the parameters of the project specifications to respond to the circumstances of the farmers, an indication of organizational vitality and potential for institutionalizing agricultural development processes. The PMUs have, thereby, exhibited the kind of institutional learning, flexibility, and responsiveness called for by AID policy on institution-building.¹⁵ They have developed and increasingly concentrated on the upland rice seed exchange

¹⁵Approved in draft by Agency Administrator, March 1982.

program and virtually cancelled fertilizer-based upland rice development, experimented with cassava and other alternative crops, encouraged double cropping and interplanting, and, at Lofa, established a small-crop research program. All these initiatives have been in response to the perceived and articulated impact of the project on the circumstances of project participants. It is likely that the PMUs would take full advantage of enlarged provision for project redesign, greatly enhancing the prospects for favorable long-term project impact. Without such provisions, the long-term project impact may be improved productivity in rice for local use but not the broadening and diversification of smallholder agriculture which is the key to a viable rural economy.

B. Institution-Building

Successful institution-building is critical to any positive long-term impact for the Bong and Lofa projects. Institution-building includes more than building smoothly functioning organizations; it extends to processes by which organizations successfully adapt to and enhance the interests of their constituents.¹⁶ The PMUs view themselves as temporary; ultimately they intend to devolve their responsibilities upon cooperative societies. The key questions are how far such devolution has proceeded and whether the cooperatives are becoming viable local institutions.

As Phase I of both projects concludes, the management teams remain indispensable to the continuation of project development activities. Although the PMUs have strengthened the cooperatives in Lofa and begun to organize them in Bong, they are not yet ready to assume the PMUs' responsibilities fully and independently. Participants' assessment of risks, potential gains, and costs of involvement with the project have been influenced by the quality of the management units. The better the management team, the more the farm households have gained confidence that the required support for their development ventures will be forthcoming and reliable. The Lofa PMU has been more successful than the Bong PMU in gaining participants' confidence. The cooperatives are not yet in a position in either project to meet participants' requirements for administrative support.

The Lofa PMU has been more effective than the Bong PMU because it has functioned more as a team. Also, two-thirds of

¹⁶Ibid.

the senior staff at Lofa have family ties to the region. Political pressures from Monrovia have affected Bong more directly than Lofa which is much further removed from the capital. For example, a Bong manager--now deputy minister of agriculture--committed the project to purchase an unbudgeted water tower without going through required competitive bidding procedures. He decided to sell off part of the project's already thinly stretched motor vehicle fleet without the knowledge of his colleagues. When the project's financial manager refused to sell a vehicle to a field staff person well connected to the PRC, a delegation from the PRC visited the financial manager to force the sale at gun point. The significance of the Bong experience, however, is that (1) the administrative troubles only diminished but did not destroy the PMU's rapport with project households, and that (2) the Bong PMU's senior staff rebelled at the mismanagement and forced the selection of a new manager and has shown administrative initiative--like Lofa--in spite of these difficulties.

The management problems at Bong have reduced the "output" of the PMU, to the disadvantage of the project participants. The Bong PMU has monitored credit records less closely at the village level so that project participants have not always been aware of their financial status in the project. Staff and farmer training has occurred on a more limited scale than at Lofa, and the availability of extension support appears to have affected farmers' decisions on whether or how much to use project inputs. A version of the training and visit extension approach has been introduced later in the life of the Bong project than at Lofa. The workshop unit at Bong has evolved more slowly, and project vehicles have been less well maintained and less reliably available to project field staff for marketing and input distribution work.

Both management units have shown ingenuity and initiative in responding to circumstances unanticipated in the design stages. The Lofa team has worked with significantly larger numbers of farmers than anticipated and introduced innovations that economize on the use of extension staff. Both projects have assumed greater responsibility than planned for maintaining feeder roads. Both have changed the emphasis in the upland rice program from fertilizer use to seed exchange for the reasons indicated above. Bong created a separate division for land use management partly because of the special circumstances of the confiscated lands in that vicinity.

The cooperatives have not diminished farmers' reliance upon middlemen for crop marketing. Indeed, the cooperatives themselves rely upon the middlemen rather than undertaking to supplant them. Farmers have sold their crop to middlemen for a fraction of the official price prior to harvest even in those instances where the cooperatives have been able to pay farmers

in cash for their harvest immediately instead of initially in promissory notes. The cooperatives have relied upon these same individuals for marketing produce, at least partly because the projects do not appear to have included provision for the cooperatives to build their own independent marketing system. In this instance, de facto reliance upon the private sector has proved to be a burden rather than a benefit to the project farmers.

Villagers have relied upon their traditional institution of kuu to compensate for weaknesses of the cooperatives. For example, where cooperative society payments have been delayed, villagers have taken turns walking to the cooperative to check whether payments have been received. The second phase of the Lofa project includes further work in developing town cooperative units in order to improve cooperatives' ability to serve villagers and to relate the cooperatives more closely to traditional patterns of village cooperation. It is not clear, however, that the projects will have the resources to change local dependence upon traditional, frequently exploitative marketing systems.

C. Social Change

The ultimate impact of the Bong and Lofa projects depends upon how they and the Government of Liberia address critical processes of social change at work in the project areas and the country at large. First, population/land ratios are increasing, reflecting an estimated 3.0 percent growth rate. For that reason, quite independently of the projects, cultivators are moving into the swamps without regard to the health risks.

Second, the distribution of income and resources is changing. There is continued if not increasing inequality between those with and those without the means of transport to enable them to utilize the new roads. Women are asserting claims to personal plots within the rubric of farm households, perhaps presaging an important trend toward individualized landholdings and undermining both the patrilineal basis of social organization and the household as the basic unit of rural production.¹⁷ Both projects have been ambiguous in their focus on the household as distinct from the individual farmer. Favorable project impact over the long term will increase if designs accurately reflect social changes at work at this level.

¹⁷See Appendix F by Svend Holsoe.

Third, roads may be the single most important legacy of the projects. Major project work, particularly in Lofa, to build and maintain feeder roads has vastly improved communications among villages and enhanced possibilities for bringing inputs to more farmers and marketing their produce more effectively. Roads may have negative as well as positive consequences, both distributed inequitably.¹⁸ The projects should anticipate and seek to influence the likely consequences of road building in directions favoring equitable growth.

Fourth, the projects have concentrated on building latrines and wells and on monitoring schistosomiasis in the swamps. They were not designed to affect the broader, interrelated problems of community health which such activities were intended to promote. Schistosomiasis may result from inappropriate water use practices well away from the site of the swamps. Latrines and wells have little value unless maintained and used properly, which has often not occurred in the project areas.¹⁹ While PMUs have shown initiative in addressing the problem of schistosomiasis in school children as a result of surveillance unit findings, the problems of community health and their relationship to agriculture have yet to be addressed in the integrated fashion necessary to produce good results over the long term.

D. External Factors

The managerially semi-autonomous projects are by no means insulated from some of the very difficulties of the Liberian socioeconomic and political order that such projects are designed to ameliorate. The Ministry of Public Works has not fulfilled its road maintenance responsibilities. The Agricultural and Cooperative Development Bank (ACDB) has been unable to deposit sufficient funds in its branch banks to permit the new projects to draw readily upon the credit to which they are entitled. The fate of the cooperative societies is related directly to policies set or policy problems left unresolved at the national level.

The Cooperative Development Authority bears responsibility at the national level for the country's cooperative movement. It has been unable or unwilling to address problems threatening the viability of project and other cooperatives at the local

¹⁸See Impact of Rural Roads in Liberia, Project Impact Evaluation No. 6, AID, 1980.

¹⁹See Appendixes C and D by Robert Roundy.

level. For example, it has permitted middlemen to organize the secession of members from the existing district cooperatives which the Lofa PMU seeks to strengthen, form them into separate and competing cooperatives (often along ethnic lines), and thereby undermine the financial solvency of the cooperatives that are to inherit the work of the PMUs. There is evidence that these seceding cooperatives are in fact fronts for a firm in another county which is undermining the Liberian Produce Marketing Corporation (LPMC). LPMC is obliged to buy from cooperatives but has no reliable means of verifying from which cooperatives the produce it purchases originates, even though the transport allowance varies with the distance from the point of origin. The firm in question represents produce as originating from the remote areas where it is registered when in fact it comes from the more centrally located "secessionist" cooperatives it has helped to organize. The firm pockets the difference. The cooperative society legislation places few obstacles in the way of those seeking to organize cooperatives, and pressure has been exerted on ACDB by very high Government officials to issue development credit to cooperatives whose credit-worthiness ACDB may find suspect.

Land tenure security in the project areas and elsewhere depends on whether new national policies emerge and how they deal with key questions such as who will be able to acquire private agricultural holdings on what terms, what protection there will be for rural-based clan holdings historically beyond the purview of national statutes, and what steps are to be taken to regularize the access of women to landholdings in their own name.

National-level support for agricultural research, at least in recent years, has been minimal. As a result, the continuous experimentation, testing, and refining of agronomic packages has not occurred. The agricultural success of projects like Bong and Lofa depends upon whether recent initiatives to strengthen CARI will result in improved, localized agricultural research closely linked to extension work.²⁰

Finally, long-term positive project impact depends upon what steps the Government is able and prepared to take to diminish the country's vulnerability to crop price fluctuations in international markets. The Government must take steps to ensure a financially sound price stabilization fund for export crops and must strengthen local and regional markets in order to moderate the financial vulnerability of small-farm households participating in commercial agricultural development

²⁰See Appendix E by Robert I. Jackson.

efforts.²¹ In fact, there is already extensive "unofficial" trading across the borders with Sierra Leone and Guinea. One of the Lofa cooperatives, for example, acquires all its coffee from Guinea for resale within Liberia. But policies have not yet evolved to treat such markets as legitimate, beneficial alternatives to production for "official" export.

V. CONCLUSIONS

The principal conclusions from the foregoing findings and analysis are as follows:

1. The PMUs have proven themselves to be effective alternatives to the inefficient centralized management (often mismanagement) prevalent in the country. They have established rapport with their constituents, purged themselves of internal administrative difficulties, coped with unanticipated realities in the project environment, and reshaped the projects as far as possible to take better account of participants' interests. The units are administratively intensive, and some staff are compensated more generously than the Government scale allows. Given that these are the first projects of this type in the country, it may be possible to replicate their results elsewhere--at lower cost--by learning from this experience.

2. Notwithstanding adjustments by the PMUs within the limits permitted by the project arrangements, the project packages for the participants still present unattractive financial risks to farmers who might otherwise expand and intensify their participation in the project. Participants have informally brought perceived risks into balance with anticipated benefits by limiting and modifying their use of project inputs and by stretching out the repayment schedule. Without action to redesign the packages in mid-course, the farmers' retreat from full participation undermines progress toward more diversified smallholder commercial agriculture.

3. Projects lack adequate provision for mid-course redesign. The preproject design work also appears to have been insufficient. Although the PMUs have made whatever changes they could, there have been basic project parameters beyond their jurisdiction to change. The loan repayment schedules,

²¹These local and regional markets are often linked to international markets. The whole question of "alternative" markets and how they can benefit smallholders needs much more attention, elsewhere as well as in Liberia.

the levels of financial support for cooperatives' transportation requirements, and the extent and focus of ongoing agricultural research and experimentation programs are among the elements over which PMUs have little real control. Redesign work in mid-course might also lead to discovery of ways to reduce project administrative costs, particularly in later years of the project, to facilitate replication elsewhere. Redesign is also necessary for the projects to have a positive and coherent influence on the direction of social changes at work in such areas as household structure, land tenure, and community health practices. The scope and extent of project redesign work might, however, have been moderated if the projects had started and made necessary adjustments on a smaller and somewhat more experimental scale at the outset.

4. Successful project implementation by semi-autonomous projects like Lofa and Bong still depends upon policy reform at the national level in such areas as land tenure, marketing, cooperative society development, and general fiscal policy. Although the projects have instituted a potentially successful form of decentralized, integrated rural development work, the substance of success still awaits favorable policy changes as well as action to permit more design flexibility at the local level.

5. These projects have been decentralized, area development projects. They have not been integrated rural development projects. (See discussion in Appendix G.)

VI. LESSONS LEARNED

The principal lessons to be learned from the experience of these projects are as follows:

1. Provision for mid-course redesign for rural development projects is essential in the interests of sustainability and replicability.

2. Complicated, multidimensional projects should emphasize testing and experimentation at least as much as implementation in the early stages in the interests of long-term impact, cost efficiency, and increased likelihood of replicability.

3. Decentralized rural area development projects are workable provided design flexibility is included and requisite policy support is forthcoming from central governments.

4. Participation by small farmers in agricultural development projects is a direct function of whether the organizational capability exists to fashion input packages that appeal to farmers' material interests, social and cultural as well as specifically economic. Decentralized project management is a requirement for establishing such organizational capability.

5. Rural development projects must be integrated, because the elements of rural progress are inextricably interrelated, but such integration need not require an extensive administrative apparatus. Progress in agricultural development, rural community health, land tenure, and local organization building cannot be compartmentalized. Providing for design flexibility at the local level may be more important than building an extensive administrative structure for dealing with such interrelated elements of rural development.

6. There is no substitute for local agricultural research, closely linked to extension and involving farmers themselves, for developing agricultural packages that can be successfully implemented.

7. Projects must provide for both adequate pre-project testing of technical packages and continuing development of them during the life of projects.

8. Integrated agricultural development must include work on the whole range of health and environmental problems arising from the introduction of new crops and agricultural practices.

APPENDIX A

METHODOLOGY AND RECONSTRUCTED LOGICAL FRAMEWORKSI. METHODOLOGY

The team began by designing a preliminary scope of work, interviewing as many knowledgeable individuals as possible concerning the project, and reading as much relevant literature as possible. The team was hampered in this respect by the World Bank's position that the sharing of most of the project documentation, even with official emissaries of a project co-financer, would violate the confidential relationship of the Bank to the Government of Liberia. The team views efforts to moderate this position as essential if the idea of donor cooperation is to be realized in practice.

In Liberia the team again interviewed as many knowledgeable persons as possible both inside and outside the Government of Liberia and read all available literature that was pertinent. Up-country, the team first interviewed the Project Management Units (PMU) collectively and individually. Then it proceeded to interview farmer participants in the projects. An effort was made to talk with people in each major ethnic area, particularly in the case of Lofa. No formal survey instrument was employed. In its daily group discussions the team developed a set of key questions and issues which guided the field interviews. The team divided into two groups in each project area. One group was accompanied by representatives of the PMUs in order to learn more of their experiences in working with the participants. The other group conducted interviews on its own, emphasizing the need to obtain the true feelings of the participants. The senior interviewers were students at the University of Liberia. Those hired locally had no known relationship to the project or to those whom we interviewed.

Following its field work, the team discussed its findings with each PMU. Returning to Monrovia, the team briefed the USAID mission and ministerial-level personnel and senior civil servants of the Ministries of Agriculture and Planning. In Washington the team held a briefing session for AID/Washington personnel.

II. RECONSTRUCTED LOGICAL FRAMEWORKS

A. Bong County Integrated Rural Development (6690139)-- Reconstructed Logical Framework

Goal:

To Increase the Welfare of the Rural Population in Upper Bong County

Purpose:

To Increase and Maintain Agricultural Productivity and Income of Small Farmers in Upper Bong County

Outputs:

1. Extension System Established
2. Project Training Programs Completed
 - 9,000 Farmers Trained
 - Cooperative Staff Trained
 - PMU Technical Staff Trained
 - Dormitory Completed at Central Agricultural Experiment Station
3. Cooperative Services Established
 - Input Supply
 - Credit
 - Marketing
4. Land Development Achieved
 - 4,500 Hectares of Tree Crops Planted
 - 2,050 Hectares of Swamp Rice Surveyed, Cleared, and Planted
5. Road Construction and Maintenance Achieved
6. 300 Village Wells Constructed
7. Schistosomiasis Control Established
8. Research Program Established for Fertilizer, Varietal Crops, Water Control

B. Lofa County Rural Development (6690142)--Reconstructed
Logical Framework

Goal:

To Improve the Welfare of Rural People in the Traditional
Sector Through Integrated Rural Development

Purpose:

To Increase Agricultural Production and Productivity of
Rice, Coffee, and Cocoa in Upper Lofa County Primarily on
Small Farms

Outputs:

1. Training Program Established for Project Management
Unit (PMU), Extension, and Credit/Cooperative Person-
nel
2. Farmer Training Program Established
3. Extension System Established
4. Cooperative/Credit System Established
5. Land Developed
6. Input Supply System Established
7. Increased Produce Marketed
8. Schistosomiasis Surveillance System Established
9. Farm-to-Market Roads Built
10. Research Programs Established
11. Rice Seed Multiplication Programs Established

APPENDIX B

ECONOMIC AND FINANCIAL EVALUATION OF
THE LOFA AGRICULTURAL PROJECT

by Annette Binnendijk

I. INTRODUCTION

The first Lofa County Agricultural Development Project (LCADP) had three major economic objectives at the time of project design. These objectives were (1) to redistribute income by increasing the agricultural productivity and thus the net income of small farmers, (2) to increase gross national production by improving efficiency in the agricultural sector, and (3) to increase import substitution for Monrovia consumption through expansion of domestic rice production. These objectives were to be obtained by the five-year LCADP project (1977-1981) by assisting small farmers in Lofa County with credit; farm inputs (such as improved seeds and seedlings, fertilizer, pesticides, tools); agricultural extension advice on new cultivation techniques; improvement of marketing institutions; and expansion of infrastructure, such as road construction. The project efforts were directed toward improvement of three crops--rice, coffee, and cocoa--all of which were traditionally cultivated by small farmers in Lofa County.

The purpose of this paper is to evaluate the impact of the Lofa project upon these three economic objectives. Although the first phase of the project has been completed, this assessment cannot truly be called an ex post evaluation, in the sense that the benefits flowing from this project will still continue for many years. An attempt is made in this appendix to project these future benefits, but of course these estimates are subject to unanticipated factors.¹

The remainder of this paper is divided into the following major sections: II. Background, which provides the context and assumptions for the financial and economic analyses; III. Farm Income Analysis, which estimates the net financial benefits to the participant small farmers and discusses the resulting income distribution implications; IV. Economic Analysis, which evaluates the economic (efficiency) impact of the Lofa project from the national viewpoint using cost-benefit analysis;

¹A follow-on project, LCADP II, has been recently approved by the World Bank. However, estimates made in this paper of future costs and benefits are those resulting from LCADP I alone.

V. Self-Sufficiency in Rice Production, which evaluates the progress of the Lofa project in attaining national self-sufficiency in rice production and examines the economic efficiency of this objective; and VI. Conclusions, which summarizes the economic evaluation results and draws implications for future directions for development projects and policy in Liberia's agricultural sector.

II. BACKGROUND

A. Farmer Participation

The Lofa project area contained approximately 14,000 farm families at the time of project design. Of these, the project target group of small farmers to be assisted by the project totaled 8,000 or about 57 percent of the total farmers in the project area. By the end of the five-year project, the total number of farmers participating in the project was 11,278 or 140 percent of the target number. Project participants were generally small farmers near the subsistence level. Many tended to be in older age groups since many younger men have migrated to urban areas seeking nonagricultural jobs. About one-quarter of the project participants were women; probably a larger number of these were in swamp rice cultivation rather than in upland rice and tree crops, which are traditionally dominated by men.

In the project design, it was anticipated that all 8,000 farmer participants would receive credit for required farm inputs. However, after program implementation, it was found that most upland rice farmers preferred a simple seed exchange program, in which farmers' traditional seed could be exchanged for a higher yielding improved variety, LAC-23. The upland rice credit package, which included fertilizer as well as improved seed, was generally not well accepted among the farmers. Experience by farmers showed that the fertilizer tended to cause lodging² when used with LAC-23. In total, 3,848 farmers participated in the seed exchange program and another 7,430 farmers participated in various credit programs for development of swamp rice, coffee, and cocoa during the five-year project period.

²Lodging occurs when land is too fertile, causing the rice to grow too fast, producing a poor yield.

B. Crop Area Development

The project's seed exchange farmers utilized improved seed to plant a cumulative total of about 5.4 thousand hectares (ha) during the five-year project period. The credit farmers utilized the project's various inputs (e.g., tools, improved seeds and seedlings, fertilizer, pesticides, and hired labor) to develop 4.6 thousand ha over the five-year period. The areas developed under credit programs included a total of 1,865 ha of new swamp rice development, and 423 ha of upland rice (see Table B-1). The average size of farms developed by the project was about 1.2 ha for upland rice credit, 1.4 ha for upland rice seed exchange, 1.6 ha for new development swamp rice, and 0.6 ha each for new development coffee and cocoa.

Table B-1. Crop Area Developed, by Project, in Hectares
(cumulative total over five years)

Crop	Program	Target Area	Actual Area	Actual as % of Target
Upland Rice	Credit	5,600	423	7.6
	Seed Exchange	-	5,390	-
	Subtotal	5,600	5,813	103.8
Swamp Rice	New Development	1,400	1,865	133.2
	Rehabilitation	500	-	-
	Subtotal	1,900	1,865	98.2
Coffee	New Development	2,300	1,164	50.6
	Rehabilitation	500	44	8.8
	Subtotal	2,800	1,208	43.1
Cocoa	New Development	1,500	1,185	79.0
	Rehabilitation	800	-	-
	Subtotal	2,300	1,185	51.5
All Crops	Total	12,600	10,071	79.9

Swamp rice rehabilitation never occurred as planned in the project design because appropriate traditional swamps were not found and possibly because farmers did not find it in their interest to rehabilitate their traditional swamps.

Rehabilitation of coffee and cocoa was strongly resisted by farmers because they viewed their mature trees as an investment and source of cash and were suspicious of cutting them down. The project abandoned attempts at rehabilitation, except for two "demonstration" coffee rehabilitation farms. After several years, these demonstration farms began showing excellent results and by the last year of the project, some 67 farmers were convinced enough to rehabilitate 44 ha of coffee trees.

C. Crop Area Planted

In the case of tree crops, which are permanent crops, the project area planted has been roughly equivalent to the cumulative total of new project areas developed. Although the new swamp rice areas developed were also meant to be permanent crop areas (continually replanted), there has been a noticeable shift toward abandonment. For example, of the 1,370 ha of swamp rice area developed cumulatively by the project during the first four years (see Table B-2), only about 777 ha, or 57 percent, were still being replanted by the last year of this project (year 5).

Table B-2. Project Swamp Rice Development and Replanting
(in hectares)

Project Year of Swamp Rice Development	Numbers of Hectares Developed	Hectares Planted in PY 5	Hectares Planted in PY 5 as % of Hectares Developed
PY 1	74	49	66
PY 2	370	247	67
PY 3	524	300	58
PY 4	402	182	45
PY 5	495	n/a	n/a

The possible reasons for abandonment of project swamp rice development areas are numerous. First, there has been a tendency for the project extension workers to concentrate upon achieving new farmer recruitment targets rather than providing sufficient followup advice to farmers in years subsequent to the initial development. Second, credit for hired labor costs were only available for the first year of development, and frequently family labor was insufficient to maintain the whole area developed in subsequent years. Furthermore, given the

high opportunity cost of labor and the absence of official price incentives (until recently) to produce surplus rice for market, the tendency appears to have been to "retreat" and only maintain that portion of the developed swamp rice area necessary to meet the family's consumption needs. In a few cases, new swamp rice developments were abandoned completely due to an increasing problem with leeches, which apparently flourished under the project's swamp rice conditions. In general, even though yields averaged somewhat higher in swamp rice than in upland rice, farmers nevertheless preferred to grow upland rice because of several reasons: (1) the work is more pleasant, (2) chances for water-related diseases are less, and (3) labor costs for development are less and there is no large debt burden.

In regions such as Foya where there is already considerable population density and thus a scarcity of land suitable for upland rice, the project's swamp rice development efforts have been more successfully maintained.

D. Crop Yields

Since the establishment of the Planning and Evaluation Division in the Project Management Unit (PMU) in 1978, four yield surveys have been undertaken. Results are available for three of these years, project years (PY) 2, 3, and 4 (1978-1980). Yield data were collected by crop and by project (new development) and nonproject (traditional) cultivation techniques (see Table B-3).

From this survey data, one sees that yields in swamp rice have been declining steadily under both project cultivation techniques and under nonproject or traditional cultivation techniques. There was no steady trend in upland rice yields, with the best yields produced in PY 3. Trends for traditional tree crops also vacillated, with the best yields occurring in PY 3. Trend data are unavailable for tree crop yields in project new development areas, since coffee and cocoa only begin to produce yields in years three to four and do not produce maximum yields until they are six to eight years old.

Table B-4 compares the crop yields targeted in the project design with the actual yields achieved. For upland rice, both cultivation techniques promoted by the project (credit and seed exchange) resulted in average yields higher than traditional upland rice techniques. However, the difference between the actual yields of project versus nonproject upland rice were considerably smaller than anticipated in the project design. For example, whereas the project design estimated an incremental yield of 700 kilograms per hectare (kg/ha) between project

and traditional yields, the actual differences in incremental yield were only 140 kg/ha for credit upland rice and 283 kg/ha for seed exchange rice over traditional upland rice yields.

Table B-3. Results of Yield Surveys
(in kilograms per hectare)

Crop	Cultivation Technique	Year of Survey		
		PY 2	PY 3	PY 4
Upland Rice	Credit	1,215	1,581	1,431
	Seed Exchange	1,024	1,771	1,644
	Traditional	945	1,483	1,408
Swamp Rice	New Development	2,766	2,280	1,603
	Traditional	2,445	1,875	1,244
Coffee	New Development	-	-	116 ¹
	Traditional	170	375	310
Cocoa	New Development	-	-	55 ¹
	Traditional	285	427	225

¹New development tree crops in PY 4 are about three years old.

Actual yields for the seed exchange upland rice tended to be higher than for the credit upland rice, which provides both improved seed and fertilizer. This difference in yields can in part be explained by the practice of using credit for areas which have shorter fallow periods (less natural fertility), whereas the seed exchange program is used in areas with longer fallow (greater natural fertility). Also, there is some evidence that the improved seed, LAC-23, tends to lodge when too much fertilizer is applied.

There is not enough data yet on ultimate yields for the new development tree crops, since these seedlings were only three years old at the time of the last survey results. How realistic the design target maximum yields are for new development tree crops is thus not yet answerable, although most agricultural advisors consulted in Liberia believed the targets were overoptimistic. Their estimates for likely maximum yields for the new development tree crops averaged about 550 kg/ha. Actual yield data for rehabilitation tree crops are unavailable since very little momentum has been achieved by the project in

this area. The actual yields for tree crops surveyed in non-project (traditional) areas were somewhat greater than anticipated in the project design.

Table B-4. Comparison of Project Design Target Yields with Actual Yields (kg/ha)¹

Crop	Cultivation Technique	Design Target Yield	Actual Yield
Upland Rice	Credit	1,700	1,456
	Seed Exchange	-	1,599
	Traditional	1,000	1,316
Swamp Rice	New Development	3,500	2,227
	Rehabilitation	3,500	-
	Traditional	1,500	1,875
Coffee	New Development	1,000	-
	Rehabilitation	700	-
	Traditional	280	295
Cocoa	New Development	850	-
	Rehabilitation	600	-
	Traditional	280	340

¹"Actual" yields are based upon three-year weighted averages from yield survey data for project years 2 to 4. Target yields from the project design are considered the maximum attainable (i.e., assumes mature tree crops).

In the project design, the target yields for new development swamp rice increased from 1,800 kg/ha for the first harvest to 3,500 kg/ha by the sixth harvest. However, the actual yield data from the surveys reveal an opposite trend, from 2,614 kg/ha for the first harvest to 1,556 kg/ha for the fourth harvest, the last year for which data exist (see Table B-5).

The probable reasons for this reversal from the expected trend are complex and may include the following factors:

- A decline in project extension agent assistance after initial development and the first harvest
- A decline in the use of fertilizer due to increasing expense and hesitancy to take out additional seasonal credit

- Lack of family labor and/or credit for hiring labor to maintain canals and dikes once developed
- Declining incentives to provide adequate labor and other inputs as production costs increased sharply while official Liberia Produce Marketing Corporation producer prices for rice remained constant at about \$0.26/kg for paddy rice

Table B-5. New Development Swamp Rice
Comparison of Design Targets with Actual Yields

Harvest	Target	Actual
1st	1,800	2,614
2nd	2,000	2,052
3rd	2,500	1,913
4th	3,000	1,556
5th	3,300	-
6th	3,500	-

That some of the factors determining this decline in swamp rice yields were external to the project seems evident from a similar trend of declining yields for nonproject swamp rice. In comparing the actual weighted average for all project swamp rice harvests (2,227 kg/ha) with the actual weighted average for nonproject (traditional) swamp rice harvests (1,875 kg/ha), it appears reasonable to assume that an average incremental yield of roughly 350 kg/ha can be attributed to the project's improved techniques. A rehabilitation program for swamp rice as envisioned in the project design never materialized, so actual survey data for this technique are unavailable.

In summary, it is too early to tell whether the increases in coffee/cocoa yields targeted in the project design will actually be met, although experts believe this unlikely. With regard to upland rice, the project design estimated increases in yields of 700 kg/ha due to the new project technologies, whereas in actuality, the incremental yields achieved amounted to only 140 kg/ha over traditional yields in the case of credit upland rice and 283 kg/ha in the case of seed exchange upland rice. Most of these yield increases were probably due to improved seed; the impact of adding fertilizer has been questionable. In the case of swamp rice, the project design anticipated that yields would go as high as 3,500 kg/ha in project developed areas compared to 1,500 kg/ha in traditional swamp rice areas. Again, the "technological package" did not prove

as beneficial as anticipated in the design. On average, only about 350 kg/ha of incremental yield can reasonably be attributed to the project, and on a yearly basis the trend in project swamp rice shows that yields have been declining precipitously, according to the Lofa yield surveys.

One can conclude from this analysis that the hypothetical yield targets developed in the project design stage were far too optimistic, and equally important, were untested. A major criticism of the project design is its failure to first test (via local applied research on experimental/demonstration farms) the actual impact the proposed "technological packages" would have on crop yields. As will be seen in the following sections, the implication of this failure has been a shifting of unnecessary risk to the participating project farmers. In some cases the project farmers would have been better off had they used traditional, labor-saving techniques.

E. The Liberia Produce Marketing Corporation and Official Producer Prices

The Liberia Produce Marketing Corporation (LPMC) has the sole responsibility in Liberia for marketing coffee, cocoa, coconut, and oil palm products. It also imports rice, buys domestic rice, and operates milling facilities for domestic paddy rice. The LPMC is Government-owned but is largely autonomous. It has two subsidiaries, the Liberia Palm Products Corporation (LPPC) and the Liberia Cocoa and Coffee Corporation (LCCC), which run plantation and outgrower schemes for producing oil palm, coconuts, cocoa, and coffee.

During the early 1970s, the LPMC had a large margin between export prices received for coffee, cocoa, and oil palm and official prices paid to producers. At that time, LPMC was a profitable operation and export crop sale proceeds were channeled into a price stabilization fund for export crops and an agricultural development fund for financing tree crop programs covering coffee, cocoa, and oil palm.

However, by the end of the 1970s, a number of factors combined to produce serious financial strains on the LPMC. The two LPMC subsidiaries and other agricultural projects initiated by LPMC suffered from inefficiency and became a financial drain on LPMC. Furthermore, LPMC was required to pay the costs of the subsidy on rice from 1979 until its recent removal. This was financed out of the stabilization funds for coffee and cocoa and the reserves of the LPMC. The LPMC subsidy amounted to \$3 million in 1980 for imported rice and another half million dollars for domestic rice. This situation was compounded by the recent fall in the world market prices of coffee and

cocoa. While the international prices for coffee and cocoa, which peaked in 1979, began to fall in 1980, the producer prices for these tree crops paid by LPMC remained constant or were increased. In addition to these problems, LPMC's funding situation was threatened further by nonpayments and borrowings by other Government of Liberia (GOL) agencies in times of severe national financial crises and huge Government deficits.

In summary, during the early 1970s when LPMC's operations were profitable, most of the funds were reinvested in projects and little was saved for the stabilization fund or emergency reserves. Thus, when problems emerged, funds were quickly depleted, and by 1980 the LPMC was forced to borrow money at high interest rates in order to carry out its marketing functions. In fact, for several months in 1980, the situation was so bad that farmers were not paid cash for their crops by the cooperatives but only received a promissory note.

The financial crisis suffered by LPMC has had considerable implications for the success of the Lofa project. Lack of LPMC funds for carrying out market operations has affected the financial stability of the district cooperatives, which suffer enough from other causes such as lack of trained manpower and poor accounting procedures, corruption and theft, and high transportation costs.

Unable to obtain funds from LPMC for produce during the crisis in 1980, cooperatives often had to resort to borrowing from banks at high interest rates and to using farmers' credit repayments that should have been deposited in the Agriculture and Cooperative Development Banks' (ACDB) Revolving Credit Fund to cover their marketing operations. In numerous instances, the cooperatives simply did not have the cash on hand to pay farmers when they delivered their produce, so they resorted to giving farmers promissory notes. This situation discouraged farmers from bringing their produce directly to the cooperatives and encouraged them to sell their produce to middlemen who could pay cash. It is estimated that the middlemen's share may have been as much as 30 percent to 40 percent of the official LPMC producer prices for coffee and cocoa, of which less than 10 percent is estimated to be legitimate costs for transportation, quality discounts, and services rendered by middlemen. Thus, the distribution of benefits, intended by the Lofa project to be aimed primarily at small farmers, may have been diverted to some degree to middlemen.

Another distribution issue that resulted from the price policies of the LPMC and GOL during the mid-1970s was the relatively large margins between the export prices and the producer prices for coffee and cocoa. Whereas it is estimated that margins of about 70 percent are necessary to support efficient market operations, the large margins of the mid-1970s meant

that coffee and cocoa growers were being "taxed" by LPMC. This of course changed rapidly in 1980 when international coffee and cocoa prices fell.

Some recent GOL price policy changes adopted by LPMC should help to mitigate their current financial problems. These were based upon the recommendations of a GOL study assessing the entire marketing operations of LPMC. First, producer prices for coffee and cocoa were dropped substantially, from a high of \$1.98/kg maintained during 1979-1980, to current levels of \$1.10/kg for cocoa and \$1.21/kg for coffee, reflecting the downward trend in international prices. These producer prices for coffee and cocoa are to be readjusted every few months with the objective of allowing a margin for covering marketing expenses but not for making a large profit.

F. Farmgate Prices

The financial farmgate prices for coffee and cocoa are derived in this study from the official LPMC producer prices, making deductions for weight and quality discounts, transportation costs, and middlemen profits. The World Bank has generally used a factor of 8 percent to 10 percent of the official producer price for such deductions. However, estimates obtained in the field suggest that the factor going to the middlemen and transportation and other marketing costs paid for by the farmer may be as high as 30 percent to 40 percent. The extent to which farmers have been able to minimize these factors and their dependence on middlemen have been determined by (1) farmers' distance from district cooperatives and their access to roads; (2) the existence of town cooperative units or ad hoc groups of farmers who have organized to market their crops jointly; (3) their district cooperative's practice of paying cash for crops received as opposed to issuing IOUs; and (4) the "wealth" of the farmer, i.e., his ability to wait for the cooperative's payment for his crops as opposed to getting cash immediately (or even in advance) from selling to middlemen.

Currently, assuming that an optimistically low factor of 10 percent of the official producer price goes to quality discounts, transportation, middlemen profits, and other marketing costs borne by the farmer, the financial farmgate prices for 1982 are estimated to be about \$1,027 per metric ton for cocoa beans and \$1,145 per metric ton for coffee beans (see Table B-6).

Economic farmgate prices for coffee and cocoa are somewhat more difficult to calculate, starting with the current CIF value of the export, deducting for insurance, freight, and

Table B-6. Financial and Economic Farmgate Prices
for Coffee Beans and Cocoa Beans, 1982
(U.S.\$ /metric ton)

Item	Coffee (Robusta)		Cocoa	
	Financial	Economic	Financial	Economic
CIF New York ¹	2,433	2,433	1,992	1,992
Freight	125	125	125	125
Insurance (2.45% CIF)	11	11	9	9
Commission (1.5% CIF)	36	36	30	30
Quality Claim (1.0% CIF)	24	24	20	20
FOB Monrovia	2,237	2,237	1,808	1,808
Port Expenses	6	6	6	6
LPMC Expenses				
Packing				
Materials	20	20	20	20
Transportation	70	70	70	70
Outstation	125	100	110	88
Insurance (.45% prod. pr.)	6	6	5	5
Interest (5% prod. pr.)	64	64	56	56
Weight Loss (3% prod. pr.)	38	38	33	33
Commission (6% prod. pr.)	76	--	89	--
Overhead & Profits (6% of FOB economic)	560	112	278	108
Value at Voinjama	1,272	1,821	1,141	1,422
Local Marketing & Transport Costs ²	127	102	114	91
Farmgate Price (per metric ton)	1,145	1,719	1,027	1,331

¹Average from January/April 1982.

²Includes quality and weight discounts. Assumes that 10 percent of financial value at Voinjama is actual costs, 8 percent economic costs.

overseas selling commission to obtain the FOB price at Monrovia. From this are subtracted port expenses and LPMC marketing costs, such as storage, loading, and inland transport, but not LPMC commissions or profits. Similarly, farmers' economic transportation and marketing costs are subtracted, but not middlemen profits. Using this method, the economic farmgate prices are estimated to be about \$1,331 per metric ton for cocoa beans and \$1,719 per metric ton for coffee beans (see Table B-6).

The international prices for coffee and cocoa beans have been declining steadily since the start of the Lofa project in 1977. In constant 1981 prices, the CIF export value of cocoa beans dropped from \$5,258/metric ton in 1977 to \$2,068/metric ton in 1981, the year the project terminated. World Bank forecasts estimate cocoa prices will decline further to \$1,452/metric ton by 1990 before rising again to \$1,716/metric ton by 1995. Similarly, the CIF export prices for coffee beans (Robusta) declined from about \$5,874/metric ton in 1977 to about \$2,244/metric ton in 1981. Price forecasts for the future in constant 1981 prices estimate a further decline to \$2,112/metric ton in 1990 and then a small rise to \$2,508/metric ton by 1995.

The LPMC also purchases paddy rice from farmers. The official purchase price of paddy remained constant throughout the Lofa project (1977-1981) at about \$0.26/kg. However, this official purchase price became progressively less attractive to farmers as their rice production costs increased, and by the end of the project very little of the domestically produced rice was actually sold to LPMC. Most surplus production above farm family consumption needs was sold directly for local rural markets or for cross-border trade with Guinea at prices considerably higher than the official LPMC price. A World Bank study estimated the actual average 1980-1981 financial farmgate price of paddy to be \$330/metric ton with seasonal peaks as high as \$430/metric ton. In January 1982 the LPMC finally raised its official purchase price of paddy rice to about \$0.40/kg. Preliminary evidence suggests that this price is now high enough to attract farmers to sell to LPMC. The financial farmgate price for 1982 is estimated to be about \$386/metric ton for farm (home) consumption.

The economic farmgate price for paddy rice in this study is based upon its import-substitution value. The import-substitution value depends upon whether the market for consumption is assumed to be Monrovia, Voinjama (Lofa), or on the farm where it is produced. Adjustments are made to the value at Monrovia by adding transportation and other marketing charges between the port and the market, and by subtracting those from the market to the farmgate. Table B-7 shows how the economic farmgate price (import-substitution value) for paddy rice is

Table B-7. Financial and Economic Farmgate Prices
for Paddy Rice: Import-Substitution Values, 1982
(U.S.\$ /metric ton)

Item	Financial	Economic
FOB Gulf	352	352
Freight	75	75
Insurance	8	8
CIF Monrovia	435	435
Port Costs	35	35
Distribution Margins	21	21
Duties & Taxes	46	--
Value at Voinjama	538	491
Transport & Marketing Costs	60	60
Value at Voinjama	598	551
Value at Voinjama (paddy equivalent) ¹	396	365
Milling Costs	50	50
Local Marketing & Transport Costs ²	40	32
Import Substitution Values		
Home Consumption	386	347
Voinjama Market Consumption	306	283
Monrovia Market Consumption	225	202

¹Conversion rate of 66 percent.

²Assumes 10 percent of financial value at Voinjama is actual costs, 8 percent economic costs.

estimated to be \$347/metric ton for home (farm) consumption. As one shifts the point of consumption away from the farm to local markets in Voinjama, Lofa, the import-substitution (economic) value decreases to \$283/metric ton, and for Monrovia consumption the value decreases to \$202/metric ton because of differences in transportation and marketing costs expended.

G. Production Costs

The Lofa PMU's Planning and Evaluation Division gathered survey data on actual labor utilized in the various project and nonproject cultivation techniques by crop. Table B-8 compares the labor requirements estimated from the Lofa surveys with the targets projected in the project design.

Table B-8. Labor Requirements by Crop:
Comparison of Design Targets with Actuals
(persondays per hectare)

Crop	Cultivation Technique (Project Year)	Design Target Total	Actual		
			Total	Family	Hired Other
Upland Rice	Credit	222	214	169	45
	Seed Exchange	-	249	196	52
	Traditional	210	276	243	33
Swamp Rice	New Development (PY1)	452	435	305	130
	New Development (PY2-3)	245	227	143	84
	Traditional	221	218	140	78
Coffee	New Development (PY1)	145	50	33	17
	New Development (PY2-3)	67	26	21	5
	Traditional	75	44	34	10
Cocoa	New Development (PY1)	140	69	46	23
	New Development (PY2-3)	57	38	30	8
	Traditional	50	22	19	3

Note: Figures may not total due to rounding.

In some cases the survey results for labor inputs differed considerably from the project design estimates. For example, in upland rice, the project design anticipated that labor

inputs under the traditional cultivation technique would be less intensive than credit techniques, because less time would be required for fertilizing and harvesting. However, the Lofa labor surveys showed opposite results, with the highest labor inputs being used in the traditional technique, with less in the seed exchange, and least in the credit technique. Besides the real possibility of estimation errors in the surveys, which were based on small samples and a problematic "recall" method, another explanation comes to mind when assessing the labor profiles by activity. As one would expect, the seed exchange technique, which had the highest yields, also had the highest labor requirement for harvesting and hauling produce, followed by the credit technique and the traditional technique. However, the labor inputs for land-clearing activities were highest for traditional techniques, lower for the seed exchange, and lowest for the credit techniques. Why this might be so in Lofa County could be explained by differences in the condition of the land where these techniques were generally practiced. Discussions in the field support the theory that farmers tended to prefer their traditional seed for first plantings after clearing heavy brush. In these conditions, with high natural soil fertility, the improved LAC-23 seeds tended to grow too fast and lodge. LAC-23 was more frequently used either for a second planting or where the fallow period was shorter and the natural fertility of the land was thus somewhat lower. Project credit techniques, which included the use of fertilizer as well as LAC-23, were apparently reserved only for cases where the natural fertility of the land was very poor (that is, for conditions with a very short fallow period) or for a second or third rice planting. In such cases, of course, the bush is much lower and fewer persondays would be required for tasks such as brushing, felling trees, or burning.

Actual labor requirements for project and traditional swamp rice cultivation techniques found in the surveys were slightly less than the targeted amounts. As anticipated, the project's new development swamp rice had a heavy labor requirement in the first year for land development, with lesser maintenance requirements in subsequent years.

Results of the Lofa surveys showed considerably lower labor requirements for development (PY 1) and maintenance (PY 2-PY 3) of coffee and cocoa tree crops than was anticipated in the project design. Similarly, the Lofa surveys found lower labor inputs for the traditional tree crops (maintenance only) than was estimated in the design. The labor estimates from the surveys for project tree crop maintenance of course did not include estimates of harvesting and hauling produce activities, since the project's new tree crops were not yielding at the time of the surveys.

In order to estimate the total labor requirements for project tree crops at maturity, estimates of harvesting and hauling of produce activities were added to the nonharvest-related activities covered in the labor surveys. The harvest-related activities for the project tree crops were estimated to be proportionally higher than similar activities surveyed for traditional tree crops because of assumed higher yields.³ Using these assumptions, the total labor requirements when the project tree crops reach maturity are estimated to be about 82 persondays for coffee and 64 persondays for cocoa.

Labor is a scarce resource in the Lofa project area, and it has become increasingly costly to hire farm labor. When the project started in 1977, the market price for hired farm labor in Lofa was about \$1.00 per personday, but by 1982 it had increased to \$2.50 per personday. The financial and also the economic price of hired labor for 1982 is assumed to be this market price of \$2.50 per personday, given that the market for agricultural labor is fairly competitive in Liberia. Determining the economic price for family labor is more difficult and controversial, however. Generally the opportunity cost of the family's labor is estimated to be the net income per family personday that would have been earned on the farm in the absence of the project.⁴ Given that traditional upland rice is by far the most commonly grown crop in Lofa, it was assumed that in the absence of the project crops, the farm family would have used its labor to produce traditional upland rice, which has an estimated net economic benefit of about \$1.40 per family labor personday. However, this may be an undervaluation since many farmers grow a mix of crops, including traditional tree crops with higher net benefits. Recent World Bank estimates of the economic value of family labor have varied considerably from study to study, ranging from \$1.00 to \$2.00. The value one chooses has considerable importance in determining the results of the economic analysis, with lower estimates for the value of family labor improving the project's incremental net economic benefits.

Land has not yet become a scarce resource in most of the Lofa project area, and farmers still have access to land for development and cultivation without cost. This paper follows the tradition of most other studies of Lofa agriculture by

³Coffee labor requirements at maturity are $26 + 30(1.86) = 82$.
Cocoa labor requirements at maturity are $38 + 16(1.62) = 64$.

⁴Unless participation in the project necessitates an increase in family labor on the farm so that income earned outside the farm was either reduced or eliminated, in which case the market wage would be the appropriate shadow price.

assuming a financial and economic value of zero for land. However, it should be noted that this situation may not continue for long in Lofa as population growth competes for land. The project itself has increased the scarcity of land available for the traditional slash-and-burn upland rice cultivation technique by developing permanent tree crops on 2,349 ha in Lofa County.

In addition to the cost of labor, other on-farm production costs include seed and seedlings, fertilizer, pesticides, and tools. Estimates of the costs of these material inputs were obtained from a number of sources. Some data were available from the PMUs' farm budget surveys, but obvious omissions and errors make this source suspect. As a check, information on the Lofa project's total annual expenditures by type of input and by crop was compared to annual data on area developed and planted to obtain unit cost estimates. However, this method only included material inputs provided by the project and excluded those inputs provided by the farmer and obtained from nonproject sources. Another useful source of information was available from a recent World Bank agricultural assessment team.

H. The Lofa Project's Revolving Credit Fund

In the Lofa project design it was planned that both development and seasonal loans would be available to participant farmers to pay for development of cropland and for farm inputs. In the case of new swamp rice, development loans were available for funding labor costs and purchasing tools for the preparation of the paddy fields. Seasonal loans were available for purchasing improved rice seed and for fertilizer. Seasonal loans were to be available to upland rice farmers to purchase improved seed and fertilizer. For project tree crops (coffee and cocoa), development loans were available for the first year for purchase of seedlings, tools, pesticides, and fertilizer, but not for labor costs. For following years, tree crop farmers were to utilize seasonal loans for purchases of fertilizer.

The terms of the loan repayments were based upon hypothetical farm budgets developed in the project design which seemed to be feasible without undue hardship, assuming the expected higher yields resulting from utilization of the project's technological package and assuming that projected crop prices materialized. Seasonal loans were to be repaid the following year with 10 percent interest. Loans for cocoa development were for 12 years with a five-year grace period and 10 percent interest on the declining balance. Coffee development loans carried the same terms except for a four-year grace period.

The records of the Lofa project's actual disbursements for both development and seasonal loans show a considerable shortfall below the project design targets. Over the five years of the project, the design had projected a total disbursement of about \$3,071,000 of development loans and \$637,000 of seasonal loans. The actual disbursements turned out to be considerably less: about \$1,393,000 in the case of development loans and about \$183,000 for seasonal loans (see Table B-9).

Table B-9. Revolving Credit Fund:
Anticipated Versus Actual Loan Disbursements
(in thousands of U.S. dollars)

Project Year	Development Loans			Seasonal Loans		
	Design Target Dis- bursements	Actual Disburse- ments	Short- fall	Design Target Dis- bursements	Actual Disburse- ments	Short- fall
1	21	56	-	13	9	4
2	471	294	177	62	40	22
3	615	394	221	110	53	57
4	868	292	576	153	43	110
5	1,095	356	739	300	37	263
Total	3,071	1,393	1,713	637	183	455

Note: Figures may not total due to rounding.

The shortfall between actual and targeted loan disbursements can be partially explained by unrealistically high targets in the project design. Within the project area, it was difficult to find a sufficient number of participants who qualified as small farmers who had access to land with some development potential. In addition, there was a tendency among some Liberian small farmers at the subsistence level to avoid indebtedness and risk, which they could ill afford. Many wanted to "see for themselves" first what would be the resulting yields and net financial benefits of accepting credit for new technological packages offered by the project. In the absence of demonstration farms, some farmers were reluctant to accept the project extension agents' advice that it would benefit them to accept credit.

Experience with seasonal credit for upland rice soon showed that farmers were increasingly reluctant to take out credit for fertilizer and greatly preferred a seed exchange

program whereby they could exchange their traditional seed for the improved higher yielding LAC-23 variety without having to accept credit. Despite the highly subsidized price of fertilizer to the farmer under the project, farmers believed that upland rice yields did not increase sufficiently with fertilizer use to justify its cost. A similar farmer reluctance to use seasonal credit for fertilizing swampland rice was observed. Farmer acceptance of development credit to prepare new swampland rice was complicated by disincentives such as a very low LPMC buying price for rice; presence in the swamps of schistosomiasis, leeches, and other health hazards; and the relative labor intensity of swamp rice cultivation combined with high labor costs. Farmers appeared more responsive to accepting development loans for the establishment of coffee and cocoa trees, encouraged by the high purchase prices being paid for these crops by LPMC during the project period.

The record with regard to farmer repayment of credit has been good when compared to general experience in other developing countries. With regard to seasonal credit, participating farmers have generally appeared willing to repay their loans when possible. Furthermore, project extension agents have spent considerable energies in the collection of payments due, with considerable success. Nevertheless, while most farmers eventually have repaid their seasonal loans, there have tended to be delays in these repayments, on average by one or two years. The practice has been not to charge farmers additional interest for delays in seasonal loan repayments. For the five-year project period as a whole, of the cumulative total of \$183,000 of seasonal loan disbursements, \$118,000 or 65 percent had been recovered by project completion. However, repayment rates for loans disbursed in the first few years of the project were considerably higher by project completion, indicating the problem is one of delayed payment rather than nonpayment (see Table B-10).

Reasons for delays in seasonal repayments may have included factors such as miscalculations in the project design of the net financial benefits of inputs promoted by the project most notably fertilizer. For example, actual farm budgets for upland rice showed that the seed exchange program (with no fertilizer) had higher net financial returns per person-day than the upland rice credit program (which included credit for improved seed and fertilizer). Farmers have shown reluctance to use fertilizer on project crops at suggested levels because of the expense of fertilizer and also possibly because of the labor cost involved in applying it. Because increases in yields and net income to farmers were less than anticipated, some difficulties may have been encountered by farmers in gathering enough cash to pay off their loans. Also, in the last year or so of the project, efforts by extension agents to recover outstanding loans were hampered by uncertainties caused by the military coup.

Table B-10. Revolving Credit Fund:
Seasonal Loan Repayments
(in thousands of U.S. dollars)

Project Year	Target Repayments	Actual Repayments	Shortfall
1	9	9	-
2	40	37	3
3	53	49	4
4	43	23	20
5	37	--	37
Total	183	118	65

Note: Figures may not add due to rounding.

There is little evidence available as yet regarding actual repayment of development loans by project farmers. Since development loans have a grace period of several years, experience so far is limited to only two years. However, the repayment record so far is poor; of the \$171 thousand of development loans that have matured by the project completion date, only slightly over \$1,000, or less than 1 percent of the amount due, had actually been collected. Apparently project extension agents have tended to put greater priority upon collection of seasonal rather than development loans. Although there is not really enough evidence available to date to say with certainty whether repayments of development loans are likely to be problematic, it is likely that some difficulties will be encountered. For example, evidence is available showing that about one-half of the area developed for new swamp rice has since been abandoned and that yields have been far lower than anticipated in the project design. Given these facts, it is likely that at least some of the farmers who participated in the swamp rice development will have trouble repaying their development loans. Determining the ability of farmers to repay loans for tree crop development is even more speculative at this time, since we do not yet know the extent to which the higher coffee/cocoa yields anticipated in the project design will materialize. Experts at the Central Agricultural Research Institute and the World Bank suggest that the yields targeted in the project design were unrealistically high. Furthermore, there have been recent unfavorable trends in the prices farmers receive from LPMC for their coffee and cocoa, which will have an additional negative impact upon their net incomes received from the project tree crops.

These factors may combine to make it more difficult for farmers to repay their development loans for tree crops, although it is really premature for a valid assessment.

In conclusion, actual data on farm budgets show that the net benefits of growing project crops were not as great as expected in the project design, and it is likely that numerous individuals may find it difficult to meet current repayment schedules. A major fault with the project design was lack of adequate testing of the technological packages promoted by the project. That is, the impacts of new inputs and procedures upon yields and production levels were not tested in local conditions. Also, sensitivity of farmers' net profits to possible changes in prices was not analyzed adequately. As a consequence of the inadequate testing and analyses, it was the farmer that assumed the risks. It may be a legitimate issue to consider whether it is fair that farmers were asked to bear this risk and be forced to repay loans in cases where an advocated technological package did not work as planned or where price changes drastically reduced farmers' anticipated net profits.

Furthermore, the current and potential loan repayment problems have implications for the continuing financial viability of the Lofa project's revolving credit fund. Shortfalls and delays in loan repayments throw into question whether the capitalization goals of the revolving credit fund can be met. Another factor affecting the fund's sustainability is the practice that cooperatives have taken (particularly the cooperative in Foya) of diverting significant amounts of the farmers' repayments to supporting cooperative market operations rather than forwarding them into the revolving credit fund at the ACDB as agreed. Of the \$118 thousand in seasonal loans repaid by farmers through the cooperatives, the actual amount deposited in the revolving credit fund is \$86 thousand. The legitimate amount retained by the cooperatives as commission for services rendered is about \$6 thousand, leaving another \$26 thousand still "unaccountably" held by the cooperatives.

III. FARM INCOME ANALYSIS

One objective of the Lofa project was to redistribute income by increasing the net income of small farmers participating in the project. One way to assess the financial benefits accruing to farm families as a result of participating in the project is by using a method called "farm income analysis." This analysis reflects the profitability of a farm enterprise or crop in a particular year. Farm budgets are constructed in which calculations are made of the net income representing the

reward to the farm family for their labor, capital, and management invested in a given crop during the year being analyzed. The net farm income for a particular crop enterprise is defined as the cash inflow (revenues from production) minus cash outflows (cost of hired labor and material farm inputs). The value of family labor is generally not included as a cost of production. The analysis made here is done before financing; that is, credit receipts and repayments are not included in the calculation of farm income.

The net farm incomes from alternative crops are generally assessed in two ways: on a per hectare basis and on a per personday of family labor basis. Which of these two methods most accurately represents the small farmer's own decision-making process in Liberia is debatable, although his anticipated returns per personday may be the more important criterion, given that labor is usually the most costly and scarce resource, while land is still plentiful in most areas.

In the farm income analyses that follow, net farm incomes before financing are estimated for 1982, one year after project termination. One limitation of this type of analysis is its short-term or annual focus, which makes it difficult to compare seasonal crops, such as rice, with crops that have longer gestation periods or greater developmental costs, such as tree crops.

A. Net Financial Benefits for Upland Rice Farmers in 1982

Table B-11 provides estimates of the net income per hectare and per family labor personday that will be earned by farm families in 1982 under various project and nonproject cultivation techniques for upland rice. Assumptions behind the farm budget calculations are provided in the table footnotes. Some major conclusions that can be drawn from these farm budgets are listed below:

- Both of the projects' upland rice cultivation techniques, credit, and seed exchange, result in higher net income per family labor personday than traditional cultivation techniques for upland rice.
- There appears to be no advantage in using credit techniques which involve fertilizer as well as improved LAC-23 seeds over the simpler seed exchange technique. The return per family labor personday is roughly the same before financing for both project techniques, so

Table B-11. Estimated Farm Budgets for Upland Rice
Before Financing, 1982

Income/Cost	Traditional	Seed Exchange	Credit
<u>Income</u>			
Yield (kg/ha) ¹	1,316	1,599	1,456
Financial Farmgate Price (\$/kg) ²	.386	.386	.386
Gross Income (\$/ha)	508	617	562
<u>Cost</u>			
Hired Labor ³	83	130	113
Seed ⁴	21	27	27
Tools ⁴	16	16	16
Fertilizer & Pesticides	-	-	24
Total Cost (\$/ha)	120	173	180
<u>Net</u>			
Net Income (\$/ha)	388	444	382
Net Income per Family Labor Personday (\$) ³	1.60	2.27	2.26

¹Yield data are the weighted averages from three annual surveys undertaken by the Lofa Project Management Unit.

²The financial farmgate price is based upon the current financial value of import substitution for home (farm) consumption.

³The estimated labor inputs required are from Lofa Project Management Unit surveys. Hired labor is assumed to cost \$2.50 per personday.

Labor Inputs (personday/ha)

Category	Traditional	Seed Exchange	Credit
Total	276	249	214
Family	243	196	169
Hired	33	52	45

⁴Costs for material inputs, such as seed, tools, fertilizer, and pesticide, are estimated based upon data from the World Bank Liberia Agricultural Assessment Team and from the Lofa Project Management Unit.

that after credit repayments, the credit farmers would be "worse off" than the seed exchange farmers.⁵

- The net income per family labor personday for all of these upland rice cultivation techniques, project and traditional, is less than the market wage for hired labor of \$2.50.

B. Net Financial Benefits for Swamp Rice Farmers in 1982

Table B-12 presents estimates of the net income per hectare and per family labor personday to be earned by farm families in 1982, utilizing traditional and project (new development) swamp rice techniques. Major assumptions behind the farm budget calculations are given in the table footnotes. Some results are summarized as follows:

- Net income per family labor personday before financing in 1982 is estimated to be somewhat higher for project cultivation techniques than for traditional techniques, assuming single crops. However, the project farmer's debt service, which is estimated to be about \$70 annually to pay off high development costs, wipes out this advantage completely. After financing, the project swamp farmer's net income per family labor personday falls to about \$3.50.
- Although there are no field survey data for farm budgets for double cropping, indications are that double cropping is possible in many project swamps and that because of labor savings, double cropping results in significantly higher net returns per family labor personday than traditional techniques.
- Net incomes per family labor personday in 1982 for project and traditional swamp rice techniques are higher than for the upland rice techniques, and also about \$1.00 higher than the daily market wage for farm labor.

⁵The idea of credit farming was that labor inputs and costs could be saved by using land for a second planting or land with shorter fallow (bush) and substituting chemical fertilizer for the lower natural soil fertility. However, the data lead to the conclusion that the seed exchange approach, which utilizes land with higher bush and natural fertility and thus requires more labor, results in higher yields and slightly better net income per family personday than the credit approach.

Table B-12. Estimated Farm Budgets for Swamp Rice
Before Financing (Single Crop), 1982

Income/Cost	Traditional	Project
<u>Income</u>		
Yield (kg/ha) ¹	1,875	2,227
Financial Farmgate Price (\$/kg) ²	.386	.386
Gross Income (\$/ha)	724	860
<u>Costs</u>		
Hired Labor ³	195	210
Seed ⁴	20	22
Tools ⁴	16	20
Fertilizer & Pesticides	-	35
Total Cost (\$/ha)	231	287
<u>Net</u>		
Net Income (\$/ha)	493	573
Net Income per Family Labor Personday (\$) ³	3.52	4.00

¹Yield data are the weighted averages from three annual surveys undertaken by the Lofa Project Management Unit.

²The financial farmgate price is based upon the current financial value of import substitution for home (farm) consumption.

³The estimated labor inputs required for a single crop are from Lofa Project Management Unit surveys. Hired labor is assumed to cost \$2.50 per personday.

Labor Inputs (Personday/ha)

Category	Traditional	Credit
Total	218	227
Family	140	143
Hired	78	84

⁴Costs for material inputs, such as seed, tools, fertilizer, and pesticide, are estimated based upon data from the World Bank Liberia Agricultural Assessment Team and from the Lofa Project Management Unit.

- If project swamp rice yields fall much below 1,600 kg/ha, as they did in 1980, the year of the last yield survey, then the net incomes per family labor person-day after financing fall below what could be earned by returning to project upland rice techniques.

C. Net Financial Benefits for Coffee and Cocoa Tree Crop Farmers in 1982

Table B-13 estimates the net income before financing per hectare and per family labor personday to be earned by Lofa farm families for project and traditional tree crop cultivation techniques in 1982, assuming mature trees and maximum estimated yields. Some conclusions that can be drawn from the farm budgets are stated below:

- Both project and traditional tree crops (coffee and cocoa) at maximum yield earn significantly higher net incomes per family labor personday than all rice cultivation techniques. However, the subsistence farmers' decision regarding which crops to plant is probably more complicated in Liberia than a simple desire to maximize net profits per personday of family labor. Otherwise, we would see farmers concentrate completely on the tree crops and other high-return cash crops. The complicating factor is the small farmers' overriding priority of providing basic food security (in the form of rice) for the family's subsistence needs first. Once the family's food supply is secure, farmers tend to grow tree crops and other crops with higher returns per personday to obtain cash. Given the average small farmer's subsistence level of living, this need to secure the family's rice requirements before beginning with higher return but also higher risk cash crops is very rational behavior. However, the lower net returns for rice partially explain why farmers have tended to limit rice production to meeting their family food requirements and have preferred alternative cash crops such as coffee and cocoa for marketing purposes. Another factor in farmers' decisions, which the "static" or "annual" approach of farm income analysis does not adequately reveal, is that profitability from rice cultivation begins in the first year, whereas production and thus income from tree crops starts three or four years after planting and only attains its maximum yield six or more years after planting, whereas costs are incurred every year.

Table B-13. Estimated Farm Budgets for Tree Crops
Before Financing, 1982

Income/Cost	Coffee		Cocoa	
	Traditional	Project	Traditional	Project
Income				
Yield (kg/ha) ¹	295	550	340	550
Financial Farmgate Price (\$/kg) ²	1.15	1.15	1.03	1.03
Gross Income (\$/ha)	339	633	350	567
Costs				
Hired Labor ³	25	48	8	23
Fertilizer & Pesticides ⁴	-	39	-	38
Tools ⁴	18	30	14	33
Total Cost (\$/ha)	43	117	22	94
Net				
Net Income (\$/ha)	296	516	328	473
Net Income per Family Labor Personday (\$) ³	8.71	8.19	17.26	8.60

¹Yield data for traditional tree crops are the weighted averages from three annual surveys undertaken by the Lofa Project Management Unit. Yield estimates for project tree crops are estimates made by the World Bank Liberia Agricultural Assessment Team.

²The financial farmgate prices for coffee and cocoa beans are based upon LPMC official producer prices, minus a 10 percent factor for quality and weight discounts, marketing, and transportation costs paid for by the farmer.

³Labor input requirements are calculated from Lofa Project Management Unit data from surveys. The traditional tree crop labor requirements are taken directly from the survey estimates, but the project tree crop labor requirements are adjusted to include harvesting-related labor needs.

Labor Inputs for Mature Tree Crops (personday/ha)

Category	Coffee		Cocoa	
	Traditional	Project	Traditional	Project
Total	44	82	22	64
Family	34	63	19	55
Hired	10	19	3	9

⁴Costs for material inputs, such as tools, fertilizer, and pesticide, are estimated based upon data from the World Bank Liberia Agricultural Assessment Team and from the Lofa Project Management Unit.

- The net income per family labor personday before financing is clearly lower in the case of cocoa using the project techniques than if traditional techniques are used. Apparently the increased income generated from higher yields is not enough to offset the increased cost of more labor-intensive cultivation techniques. Some might say that the estimates of traditional yields obtained from the Lofa surveys are unrealistically high. However, even if one assumes considerably lower traditional yields, say 250 kg/ha, the net income per family labor personday would still be higher using traditional labor-saving techniques.
- In the case of coffee, the difference in net incomes per family labor personday before financing is small and slightly lower for the project cultivation techniques than for the traditional techniques. This does not consider the extra debt burden of the project coffee farmer, which would reduce the benefits of the project techniques even more. However, again one might argue that the traditional yield used, which was based on Lofa yield survey data, is too high. If one lowers the estimate of traditional yields to, say 250 kg/ha, then the net income per family personday falls to about \$7.19 and the advantages of the project approach would be more significant.

D. Summary of Project Impact at Farm Level in 1982

In summary, the farm families who participated in the Lofa project are estimated to earn considerable average annual net incomes in 1982 as a result of cultivating project crops. Table B-14 summarizes the estimated average annual net incomes earned by farm families participating in project crops.

While these net incomes earned by farm families participating in the project are significant, one must really take the analysis one step further to consider the incremental net incomes earned by farm families as a result of participating in the project, that is, the net benefits earned by participating in the project minus the net income that might have been earned in the absence of the project. In order to estimate this incremental net income attributable to the project, one must make some crucial assumptions about what these farm families would have done with their labor and other resources in the absence of the project. The options one might assume include (1) doing nothing, (2) growing traditional upland rice in all cases, (3) growing various traditional crops (for example, traditional cocoa instead of project cocoa, traditional swamp rice instead of project rice, etc.), or (4) hiring out labor at the market

rate. Which of these possibilities one assumes to be the "true" opportunity cost of labor will make a large difference in perceived incremental net benefits attributable to the project.

Table B-14. Net Incomes Before Financing Earned by Participant Farm Families, 1982

Project Crop	Net Incomes per Ha (\$)	Average Farm Size (ha)	Net Incomes per Farm Family Before Financing (\$)
Upland Rice Credit	382	1.2	458
Upland Rice Seed Exchange	444	1.4	622
New Development Swamp Rice ¹	573	1.1	630
New Development Coffee	529	0.6	317
New Development Cocoa	466	0.6	280

¹Estimates assume single cropping. The average farm size developed for project swamp rice was 1.6 ha, but only a portion of this on average is operated.

One can probably rule out the likelihood of large-scale idleness in the absence of the project, and also of large-scale shifting into wage labor since there is probably a limited demand for labor in Lofa. Also, it may not be realistic to assume that in the absence of project extension assistance and credit, farmers would have used their labor to grow the same crops but would have utilized traditional cultivation methods.

Probably the most realistic assumption about the opportunity cost of labor is that in the absence of the various project activities, farm families would have used their labor to grow traditional upland rice, the single most widespread agricultural activity in Liberia. Thus, assuming that the opportunity cost of the farm family's labor is equal to the net income per person-day that would have been earned from growing traditional upland rice, the incremental net incomes attributable to project crops would be estimated as shown in Table B-15.

Table B-15. Estimated Incremental Net Incomes Before
Financing Attributable to Project, 1982 (US\$)

Project Crop	Net Income/Ha (before financing)	Opportunity Cost/Ha	Incremental Net Income/Ha	Incremental Net Income/ Farm Family
Credit	382	270	112	134
Seed Exchange	444	314	130	182
New Dev. Swamp	573	229	344	378
Coffee	529	90	439	233
Cocoa	466	77	389	233

In conclusion, the small farmer participants in the Lofa agricultural project appear to be making reasonable net annual incomes from undertaking the various production activities and techniques encouraged by the project. In all likelihood, their incremental net incomes are positive; that is, they will be better off by having participated in the project production activities than if they had grown traditional upland rice as the alternative.

However, assessment of the farm budgets does have some other important implications for future policy and program directions. When one considers the debt repayment burden upon the Lofa project farmers, the new development labor-intensive cultivation techniques encouraged by the Lofa project are not always more beneficial to the farmer than the traditional techniques used by nonproject farmers in Lofa. In the case of cocoa, the traditional cultivation approach was definitely preferable to the project's labor-intensive techniques. In the case of coffee, there was also no clear financial advantage to using project techniques over the traditional cultivation methods. A similar situation was found with regard to new development swamp rice techniques when single cropping was involved; no significant financial benefits after debt repayments accrued to the project farmer over earnings from traditional swamp rice cultivation techniques. Although survey data are not available, there is some evidence that the financial benefits of the new project techniques are significantly greater in those swamp areas where double cropping is a possibility. However, in the case of upland rice, the project's cultivation techniques (consisting mainly of introducing improved seed) did provide a higher net financial return to the participating farmers than traditional upland rice techniques provided.

IV. ECONOMIC ANALYSIS

Economic analysis utilizes data from the financial analysis of farm enterprises, but differs from it in several important ways. The economic analysis of a project reflects its profitability not only from the viewpoint of participating farmers but also from the viewpoint of society as a whole. That is, it analyzes the capacity of the project to maximize the efficient use of a nation's resources in producing national income.

Economic analysis is concerned with the flow of real resources, which are valued in terms of their opportunity cost rather than their market prices. Transfer payments, loan receipts, and debt service are excluded from the economic analysis. Data on the incremental net economic benefits to farmers from each of the project enterprises (e.g., coffee, cocoa, and the various improved rice-cultivation techniques) are aggregated, using the adjusted prices to reflect real economic value. Economic analysis also incorporates the project's off-farm investment and operating costs, which are not included in the farm enterprise financial analyses.

A. Economic Cost and Benefit Assumptions

The Lofa project's off-farm costs were obtained from the records of the LCADP PMU, and include the costs of public buildings, vehicles, and equipment; salaries of extension workers and PMU staff; vehicle-operating costs; and costs of the revolving credit fund, consultants, general services, and contingencies. However, the costs of LCADP farm inputs were subtracted to avoid double counting, as they are included in calculations of on-farm costs. In addition to these project costs, estimates of the GOL's investments in road construction in the project area were added.

The project's benefits included estimates of the terminal or salvage values of the project's buildings, vehicles, equipment, and furniture (estimated by the PMU staff), and of course the aggregate of the incremental net economic benefits to farmers resulting from each of the project's crop enterprises.

For each project crop, the projected stream of incremental net economic benefits to farmers was calculated on a per hectare basis over the estimated life of the project (30 years). This was done by multiplying projected yields by the economic farmgate price to obtain the projections of gross economic benefits. From this the stream of on-farm costs such as hired labor, cost of seed, fertilizer, and tools, was subtracted from

the benefits to get the net economic benefits of the project. Finally, a stream of estimated net economic benefits without the project was calculated and subtracted from the net economic benefits with the project to obtain the stream of incremental net economic benefits of the project during the life of the project. The estimates of the net economic benefits to the farm family without the project were based upon the assumption that in the absence of the project the farm family would have used its labor and other resources to grow traditional upland rice. To aggregate the incremental net economic benefits to farmers for each project crop, the stream of incremental net economic benefits per hectare was multiplied by the projected aggregate or total area cropped over each year of the project life.

Assumptions made in calculating the incremental net economic benefits to participant farm families include the following:

1. Yields: It is assumed that the yields for project rice cultivation techniques will remain constant in the projections at the levels achieved during 1978-1980 (weighted averages of 1.60, 1.46, and 2.23 metric tons per hectare, respectively, for upland rice seed exchange, upland rice credit, and single-cropped new development swamp rice. Yields for new coffee and cocoa tree crops are projected to increase to a maximum of 0.55 metric tons by 1982 and remain constant thereafter.

2. Area cropped: In the cases of the project tree crops and improved upland rice, it is assumed that the cumulative area developed by the project will continue to be 100-percent cultivated or replanted using project techniques. In the case of new swamp rice, actual trends in area replanted during the first five years were used, which were significantly less than 100 percent of the area developed. However, it is optimistically assumed that by 1982 the trend toward abandonment is halted and that area replanted remains constant thereafter. It is furthermore assumed that about 25 percent of the new swamp rice area is double cropped.

3. Economic farmgate prices: The economic farmgate prices used for coffee beans, cocoa beans, and paddy rice are those calculated for 1982 in Tables B-6 and B-7. These economic farmgate prices are assumed for simplicity to remain constant throughout the projection period. The economic values of the exported outputs (i.e., coffee and cocoa) were calculated by subtracting insurance and freight charges from the CIF value to get the FOB Monrovia value and then subtracting port expenses, LPMC storage, inland transport and marketing costs (excluding commissions or profits), and transportation and quality discounts paid by the farmer. The economic farmgate prices used

are \$1,719 per metric ton for coffee beans and \$1,331 per metric ton for cocoa beans. The economic farmgate price for paddy rice is similarly assumed to remain constant at the 1982 level of \$347 per metric ton. The economic value of rice used is the value of import substitution for home consumption, measured by taking the CIF value of clean rice in Monrovia, adding port charges and transport-handling costs to the local cooperatives in Voinjama, Lofa, converting it into paddy equivalent (using a 66 percent conversion factor), subtracting the costs of milling, and adding transportation costs from farmgate to Voinjama.

4. Labor requirements and costs: The requirements for hired and family labor for development and cultivation of project crops are assumed to be those observed in the 1978-1980 surveys, except that in the cases of coffee and cocoa, estimates of labor requirements for harvesting were added, since harvesting had not yet begun on project tree crops at the time of the surveys. The economic price of hired labor is estimated to be \$2.50 per personday (in constant 1981 prices), which is the current market price. In the case of family labor, however, a shadow price of \$1.40 per personday is used, reflecting the economic opportunity cost of the family labor. This assumes that in the absence of the project, the farm family would have used its labor to produce traditional upland rice, which has an estimated net economic benefit of \$1.40 per family labor personday.

5. Land costs: Given the current ample amount of land in most of the project area, the economic cost of land is set to equal zero.

6. Other on-farm investment and operating costs: The other production costs associated with the project's cultivation techniques were based upon the 1978-1980 empirical surveys undertaken by the PMU staff and upon farm budget estimates from a recent World Bank Agricultural Assessment Report on Liberia.

7. Financing: On-farm costs and benefits were calculated before financing in the economic analysis; that is, loan receipts and debt repayments were excluded from the economic analysis since they are merely transfer payments to farmers from others in society.

B. Economic Analysis Results

This study uses the internal economic rate of return as the discounted measure of project worth, the method used in the project design. The economic rate of return reflects the return to society's capital invested in the project, and can be interpreted as the average rate of interest earned by investing

society's capital in the project. It is the discount rate that equalizes the present worths of the project's cost and benefit streams. The economic worth of the project is assessed by comparing the project's economic rate of return to the opportunity cost of capital, i.e., to the economic rate of return of alternative development projects.

Based upon the cost and benefit assumptions outlined above, the economic rate of return on the Lofa project is 13 percent. This is considerably less than the appraised economic rate of return of 26 percent forecast in the project design. Nevertheless, when compared to the opportunity cost of capital estimated recently by the World Bank to be 10 percent,⁶ the Lofa project's economic rate of return is higher, indicating that the project was worth undertaking from an economic efficiency viewpoint.

This set of assumptions that result in an internal rate of return of 13 percent might be considered optimistic in several respects:

- The area cropped in swamp rice is assumed to be constant after 1982 despite the recent downward trend.
- Yield for swamp rice is assumed to remain constant at the three-year weighted average, despite a downward trend over these years.
- Economic farmgate prices are assumed to remain constant at 1982 price levels, despite World Bank forecasts of further decline in real prices for coffee and cocoa beans.
- The economic farmgate price used for rice paddy was based upon the import-substitution value for home (farm) consumption, whereas the project design assumed Monrovia consumption. If the current import-substitution value for Monrovia (or even Voinjama) consumption were used, the economic farmgate price would be much lower.
- The shadow economic price of family labor used was based upon the net return per family person/day of growing traditional upland rice. This value is relatively low compared to other possible assumptions such as the use of the market wage rate or the net return on other traditional crops.

⁶World Bank, Liberia, Lofa County Agricultural Development Project II, April 5, 1982, Annex 9, Table 2.

Nevertheless, these assumptions are more pessimistic than assumptions used in a cost-benefit calculation undertaken by the Planning and Evaluation Division of the PMU at the close of the Lofa project, which resulted in an economic rate of return of 19 percent. Their assumptions differed from those of this study in several major respects:

- New development swamp rice yields are projected to increase to about 3,500 kg/ha. Yields of project tree crops are estimated to reach 850 kg/ha for cocoa and 1,000 kg/ha for coffee.
- The total area of new swamp rice operated or cultivated is assumed to level off at about 1,580 ha (as opposed to the 1,270 ha assumed in this study).
- The economic farmgate prices used were estimated to be \$330/metric ton for paddy rice, \$1,738/metric ton for coffee beans, and \$1,364/metric ton for cocoa beans. (Although based upon older information, these prices are fairly close to those used in this study: \$347, \$1,719, and \$1,331, respectively.)
- Labor costs of production were treated differently in these PMU calculations than in methods used in this study, making comparisons difficult. But the overall effect was to reduce significantly the economic cost of labor used for cultivation of project crops, probably making it unrealistically low.

C. Sensitivity Analysis

As mentioned at the outset of this report, this economic analysis of the Lofa project is not a true ex post evaluation because on-farm benefits and costs are likely to continue for another two decades or so into the future. While we can be fairly sure of the off-farm costs and benefits of the project, estimating future on-farm costs and benefits is subject to considerable forecasting error. The data used to analyze agricultural projects are affected by uncertainty in predicting prices as well as yields and production. Errors in predicting prices can be minimized by assuming constant prices, but real relative changes in the prices of major inputs or outputs can affect results. In addition to future prediction errors, even the data on past on-farm costs and benefits may be subject to considerable errors due to unreliability of surveys or inappropriate observations.

Therefore, it is useful to identify the crucial factors that could most seriously affect the project and to test the

effect on the original result of changes in the values of these factors. This technique is called sensitivity analysis and is useful for dealing with uncertainty and in drawing attention to critical factors that could affect the economic success of the project.

The sensitivity analysis undertaken below examines the impact upon the Lofa project's economic rate of return of changing one or a related set of critical variables at a time, while keeping all other assumptions constant (as in the original assumptions).

1. Changing the shadow price of family labor: To examine how critical the choice of the shadow price of family labor is to the results, the economic analysis calculations were redone assuming a value of family labor equal to the market rate of \$2.50 per personday. The impact of this change upon the original results is highly significant, reducing the project's internal economic rate of return to zero or less. For all project rice production techniques, the stream of incremental net benefits is negative when the higher value for family labor is used.

2. Changing the economic farmgate price of rice: The economic farmgate price of paddy rice was changed to the import-substitution value for Monrovia consumption (\$202/metric ton) to assess the impact this lower value would have upon the overall economic value of the project. The results are very sensitive to this change in assumptions, reducing the future stream of on-farm incremental net benefits for all project rice production techniques to negative values. This indicates that it makes no sense economically, given the current project rice production technologies and transportation/marketing costs, to grow rice for Monrovia consumption. The overall Lofa project's internal rate of return is reduced to zero or less under this assumption. Even assuming an import-substitution value of paddy rice for Voinjama (local market) consumption (\$283/metric ton), the economic rate of return for the Lofa project as a whole is lowered considerably to about 8 percent, below the estimated opportunity cost of capital. The implication of this analysis is that while it makes sense from an economic viewpoint to produce domestic rice under projects such as Lofa for the objective of meeting on-farm consumption needs, it is not economically efficient to produce rice in Lofa for Monrovia consumption.

3. Changing the yield estimates: Another factor that should be tested is the sensitivity of the cost-benefit results to alternative assumptions regarding yields. This is desirable because the reliability of the Lofa PMU's yield survey data may be questionable, but even more important, because of the difficulty in accurately predicting future yields. Whereas the yield data used in the initial cost-benefit analyses were based

upon actual survey data for rice and estimates made by the World Bank Agricultural Assessment Team to Liberia in the case of tree crops, some might consider these estimates as too pessimistic, particularly with regard to future trends in project tree crops and new swamp rice yields. So, taking a more optimistic view of the future, the yields for new swamp rice are assumed to increase (reversing their recent downward trend) to 2,700 kg/ha. Similarly, the yields of the project tree crops are assumed to reach 700 kg/ha at maturity in 1982. Labor costs are also estimated to increase to account for increased harvesting manpower requirements under these increased yield assumptions. With these optimistic yield assumptions, the Lofa project's economic rate of return increases to 16 percent.

In conclusion, the results of the economic analysis of the Lofa project are very sensitive to adjustments in some factors, in particular to the estimated opportunity cost of farm family labor and also to the assumed location of the consumption market for the rice, affecting the import-substitution value used.

D. Summary

In summary, according to the "best guess" estimates of this observer regarding the most likely stream of future on-farm costs and benefits, the Lofa project has a positive economic worth, with an internal rate of return somewhat higher than the opportunity cost of capital. However, it is not as high as anticipated in the project design. The success of the project was limited due to (a) lower than anticipated yields from the project's "technological packages," (b) unanticipated increases in the value of labor that made labor-intensive cultivation practices uneconomic, and (c) unanticipated decreases in the international prices paid for the crops grown under the project.

The positive economic worth of the Lofa project, however, is based upon some critical assumptions. For example, it assumes that the rice produced under the Lofa project will be consumed primarily on the farm or sold in close-by local markets. If one were to assume instead that the rice is for Monrovia consumption, this would drastically reduce the economic worth of the project. Also, it assumes that participating farmers, in the absence of the project, would have used their time to grow traditional upland rice. Again, if one were to assume instead that the time spent on the project would be used for growing other traditional crops such as tree crops or for hiring out their labor, the economic worth of the project would be far lower.

In concluding this section, a few words should be said about the limitations of doing a cost-benefit analysis of the Lofa project. First of all, although the availability and quality of survey data were probably far greater than for most development projects, they are nevertheless based on small samples and recall methods that may affect reliability. Second, because the project started just six years ago, much of the on-farm cost and benefit streams still remains in the future and is therefore subject to prediction errors. Another limitation with cost-benefit analysis of the Lofa project is that the single measure of project worth (the internal rate of return) does not indicate the separate economic contributions and limitations of the various crops and production techniques promoted by the project. Finally, the economic analysis does not deal with other legitimate objectives of the project, such as income distribution or self-sufficiency in food production. As we saw earlier, participation by farmers in project activities did raise their incomes. The participants were limited to small, poor farmers, and thus the project promoted the objective of income distribution and of improving the lives of the rural poor in Lofa County. Now we will turn to look at the impact of the Lofa project on the third economic objective, promoting national self-sufficiency in rice production.

V. SELF-SUFFICIENCY IN RICE PRODUCTION

At the time of project design, one of the project's stated objectives was to assist in Liberia's import substitution of rice for the Monrovia market. It was estimated in the project design that the project's incremental rice production would amount to about 20 percent of rice imports by project completion. In fact, the project's incremental rice production in 1981 amounted to only about 3 percent of total rice imports.⁷ Thus, the actual incremental production of rice attributable to the Lofa project has had considerably less impact upon attaining national self-sufficiency in rice than was anticipated in the project design.

Trend data show that for Liberia as a whole, domestic rice production has been stagnating at about 245 thousand metric tons of paddy since the mid-1970s, while rice imports have been growing steadily. Rice imports have been used not only to meet Monrovia's growing consumption needs but also increasingly to

⁷Rice imports in 1981 amounted to about 99 thousand metric tons of paddy, whereas the incremental rice production attributable to the Lofa project was an estimated 3 thousand metric tons of paddy.

supplement rural consumption. It is estimated that more than one-third of total imported rice is now being consumed in rural areas.

Why has Liberia, and in particular the Lofa project, been unable to progress toward its stated objective of achieving greater rice self-sufficiency? A partial answer can be found in trends in LPMC producer prices for paddy rice. In 1976 the official producer price for paddy was increased from \$0.22 per kg to \$0.26 per kg, but then remained constant throughout the subsequent years until very recently. During this time, however, the cost of rice production, especially the price of labor, increased significantly. Estimates for the average cost to farmers of producing a metric ton of paddy rice during the project period (including the cost of family labor of \$1.60/person/day) range from about \$230 to \$386 depending upon the cultivation technique used.⁸ Estimates of the farmers' average transportation and marketing costs to local cooperatives during the project period is \$40/metric ton. Yet during the 1977-1981 project period farmers would have received only about \$260/metric ton of paddy rice. Clearly, this low LPMC producer price did not offer enough financial incentive to the farmers to make growing rice for sale to the LPMC profitable under most cultivation techniques. That rice production for national marketing was apparently marginal during the project period is obvious when one compares data on average LPMC purchases of paddy rice with estimated total domestic production of paddy (roughly 2 percent).

However, there has been some sale of domestic rice production occurring unofficially in local rural markets or in markets in neighboring countries, estimated at roughly 20 percent of total domestic production in recent years. The price paid to farmers for paddy rice in these markets is estimated to have averaged about \$0.33/kg, but with seasonal peaks as high as \$0.39/kg.

Recently, in January 1982, the official LPMC producer price of paddy was increased to about \$0.40/kg. Preliminary evidence from this year's harvest suggests that this price increase will be sufficient to encourage sale of surplus rice to LPMC, although the extent of these sales is not yet known. Also, LPMC purchase prices for alternative crops such as coffee and cocoa have dropped significantly since 1979. This will have an impact upon farmers' relative profits from producing

⁸\$386 for traditional upland, \$334 for upland credit, \$281 for seed exchange, \$242 for traditional swamp, and \$231 for new swamp (excluding developmental costs).

rice for market versus other cash crops and may influence farmers' production decisions in the future. However, even with these new price structures, illustrative farm budgets suggest that tree crops will still provide the farmer with higher annual net returns per labor person-day than rice cultivation. On the other hand, profits from rice production can be made within one season, whereas newly planted tree crops take several years before production begins and have larger developmental costs. It is still debatable whether the increase in the LPMC producer price for paddy will result in significant increases in domestic rice production in the future.

A related but broader question than why little progress has been made toward attaining Liberian rice self-sufficiency is to ask whether it makes economic sense for Liberia to pursue the objective of national rice self-sufficiency, particularly through the policy of increasing official producer prices for rice. It should be cautioned that the argument that follows is limited to economic efficiency considerations. There may be other legitimate reasons for pursuing the objective of national self-sufficiency in rice production of a noneconomic nature, such as political, income distribution, or security in food supply goals.

Given the current state of technology for rice cultivation in Liberia (i.e., with high costs of labor, poor transportation and marketing facilities, etc.), it does not make economic sense to try to promote domestic rice production to meet all national consumption needs, particularly urban consumption needs. A 1980 study by the West Africa Rice Development Association on the prospects of self-sufficiency in rice in West Africa showed that Liberia had the lowest comparative advantage in rice production of all the West African countries.⁹ The study concluded that the production of rice for consumption in the capital city (Monrovia) was socially unprofitable for all production techniques, including the improved project techniques, but noted that this conclusion did not imply that production for home consumption by farm families was necessarily socially unprofitable. A study by Erik Monke (see footnote 9) similarly concluded that the improved (project) techniques were more efficient than traditional techniques and that social profitability was nearly positive for home consumption, but that all techniques were unprofitable for Monrovia delivery. These same basic results were reinforced as still valid in a

⁹West Africa Rice Development Association, Prospects of Self-Sufficiency in Rice in West Africa, July 1980. See also Eric A. Monke, "The Economics of Rice in Liberia" in Rice in West Africa: Policy and Economics, Scott R. Pearson, ed., Stanford University Press, 1981.

more recent assessment of Liberian agriculture by the World Bank. This World Bank study found nearly all current rice production techniques, including the project improved techniques, to be socially unprofitable for Monrovia delivery, although some approaches were profitable or economic for home consumption.

The economic analysis done for this report reached similar conclusions. The stream of on-farm incremental net economic benefits was negative when the import-substitution value of rice for Monrovia delivery was used, positive when the import-substitution value of rice for home (farm) consumption was used, and mixed (depending on cultivation technique) when the import substitution value for local (Voinjama) market delivery was used. The impact of the choice of consumption point on the economic feasibility of the Lofa project as a whole was significant. The assumption that the rice production was for home consumption made the project's economic rate of return a reasonable 13 percent, higher than the opportunity cost of capital. Changing the consumption point to Monrovia made the project's economic rate of return negative, suggesting that Liberia would not be able to even regain its initial investment costs.

There are a number of reasons why the net social profitability of domestic rice production is so low in Liberia, including the fact that most improved rice technologies (including those promoted by the Lofa project) were developed mainly for Asian conditions and were thus not well adapted to the resource endowments of Liberia. Whereas these "improved" techniques tend to be labor-intensive, Liberia still has a relatively low population density and high labor costs relative to the value of land. Furthermore, the costs of transport, marketing, and the provision of Government services and infrastructure in rural Liberia are relatively high compared to other areas of the world or even compared to other West African countries.

What then, are the implications of this assessment for GOL rice policy? Certainly, encouraging domestic rice production to meet Monrovia consumption needs through high producer prices is inefficient and will result in lower economic growth. This price policy requires subsidies that other Liberians will have to pay, either taxpayers, consumers, or producers of other crops. If the objective of national self-sufficiency in rice is to be pursued, it should be through programs aimed at introducing new labor-saving rice production technologies, or at reducing transportation and distribution costs by building better roads and improving the efficiency of the cooperatives and LPMC operations. In this sense, the Lofa project was partially on track. The Lofa project's promotion of rice production was useful to the extent that it concentrated upon improving the efficiency of rice production to meet farmers' home consumption

needs and thus freed labor resources for other more productive activities such as coffee and cocoa planting.

VI. CONCLUSIONS

A. Impact at the Farm Level

The small farmer participants in the Lofa agricultural project appear to be making reasonable net annual incomes from undertaking the various production activities and techniques encouraged by the project. Their incremental net incomes are positive for all project crops. That is, they are better off for having participated in the project production activities than if they had used their resources to grow traditional upland rice instead.

However, in a number of cases the cultivation techniques promoted by the Lofa project extension agents do not have significant financial advantages over traditional techniques for growing similar crops, particularly when one considers the debt repayment burden that the project farmers are required to pay. In the case of the tree crops, particularly cocoa, the traditional cultivation approach was preferable (in terms of net incomes earned per person/day) to the project's labor-intensive techniques. Similarly, with the project's new development swamp rice technique, when single cropping was involved, there were no significant financial benefits after debt repayments over earnings from traditional swamp rice cultivation techniques. Indeed, it is only in the case of upland rice that the project's cultivation techniques did provide a significantly higher net financial return to the participating farmers than traditional upland rice techniques provided. And this benefit was primarily the result of an improved seed variety, LAC-23, rather than of the use of fertilizer, pesticides, or other changes in cultivation practices.

Implications of this assessment for future agricultural projects similar to the Lofa LCADP suggest that promotion of labor-intensive "improved" cultivation techniques is inappropriate to Liberia's current resource endowment and will not necessarily benefit farmers more than the traditional techniques of cultivation. Rather, emphasis should be placed upon continued improvement and dissemination of high-yield rice seed varieties and of tree crop seedlings of high genetic standards.

Another implication is the need for more "upfront" applied research in projects that would test how new cultivation techniques impact on yields within local settings before attempting widespread dissemination and advocacy of new approaches to

farmers. The Lofa project design was far too optimistic regarding the anticipated yields of project crops, and without proper testing of the validity of these assumptions, farmers in effect were asked to bear the risk of miscalculations.

B. Impact at the National Level

A true ex post economic analysis of the Lofa project is not possible at this point because on-farm benefits and costs are likely to continue for another two decades into the future and are therefore subject to forecasting errors. Even the historical data available are somewhat suspect and may contain sampling, recall, or other errors. Nevertheless, according to some reasonable "guesstimates," the Lofa project's economic worth is positive, with an overall internal rate of return somewhat higher than the opportunity cost of capital. However, it is not as high as anticipated in the project design. The economic success of the project was limited due to factors such as lower than anticipated yields from the project's "technological packages," decreases in the international prices paid for the crops grown under the project, and increases in production costs, notably the cost of labor.

The assessment of a positive economic worth for the Lofa project, however, is based upon some critical assumptions. First, it assumes that participating farmers, in the absence of the project, would have used their time to grow traditional upland rice. If one assumes instead that their time spent on the project would have been used for growing other traditional crops such as tree crops or for hiring out their labor, the economic worth of the project would be far lower. Second, it assumes that the rice produced under the Lofa project will be consumed on the farm where it is produced. If one assumes instead that the rice would be for Monrovia consumption, this would drastically reduce the economic worth of the project. The implication of this analysis is that given the current state of rice production technologies promoted by the project, it only makes economic sense to encourage rice production to meet on-farm consumption requirements and possibly limited demand in local rural markets. However, it is not economically efficient to attempt to meet Monrovia's requirements for rice via the current project cultivation techniques or by artificially increasing the producer prices for paddy rice. One might argue that this is desirable for purposes of redistributing income to the rural poor, or for national food security reasons, but it should be understood that to attempt to expand domestic rice production using current technologies (including the Lofa project technologies) to meet Monrovia consumption needs implies a loss of gross national production.

In the future, if the objective of national self-sufficiency in rice production is to be pursued in Liberia, the implications of this assessment are that it should be pursued via policies that reduce production and marketing costs, such as (1) searching for and introducing labor-saving technologies for rice production appropriate to Liberia's resource base, (2) continuing to improve the transportation system, and (3) encouraging greater efficiency and accountability in the marketing operations of LPMC and local cooperatives.

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**Tables for Economic Analysis of
the Lofa Project (Original Assumptions)**

Table B-16. Aggregate Lofa Project Economic Costs of Benefits
(in thousands of dollars)

Costs/Benefits	Project Year											
	PY 1	PY 2	PY 3	PY 4	PY 5	PY 6	PY 7	PY 8	PY 9	PY 10	PY 11	PY 12-30
Off-Farm Project Costs												
LCADP Project Costs ¹	1,905	2,159	2,639	3,378	3,642	-	-	-	-	-	-	-
GOL Road Construction Costs	481	137	146	151	122	-	-	-	-	-	-	-
Total	2,386	2,296	2,785	3,529	3,764	-	-	-	-	-	-	-
Off-Farm Project Benefits												
Terminal Values of Buildings, Vehicles, and Equipment	-	-	-	-	-	126.9	126.9	46.6	46.6	46.6	46.6	17.2
On-Farm Incremental Net Benefits												
Upland Credit Rice	7.2	23.0	27.0	38.2	38.2	38.2	38.2	38.2	38.2	38.2	38.2	38.2
Upland Seed Exchange Rice	0	26.4	200.3	373.7	582.1	582.1	582.1	582.1	582.1	582.1	582.1	582.1
New Swamp Rice (single crop)	-4.1	0	0	130.9	196.1	365.4	365.4	365.4	365.4	365.4	365.4	365.4
New Swamp Rice (double crop)	-1.0	0	0	32.7	49.0	91.4	91.4	91.4	91.4	91.4	91.4	91.4
New Coffee	-32.9	-115.0	-96.5	-12.1	42.7	281.8	492.4	682.9	774.3	866.0	866.0	866.0
New Cocoa	-10.7	-89.4	-105.2	-127.6	-174.0	49.4	220.8	407.9	571.6	660.1	660.1	660.1
Total	-41.5	-155.0	25.6	435.8	734.1	1,408.3	1,790.3	2,167.9	2,423.0	2,603.2	2,603.2	2,603.2

Internal Rate of Return = 13%

¹Includes buildings, vehicles and equipment, salaries, vehicle-operating costs, the revolving credit fund, consulting, general services, and contingencies. Excludes farm input costs to avoid double counting (farm inputs are included as on-farm costs).

Table B-17. Aggregate On-farm Incremental Net Economic Benefits
(in thousands of dollars)

Crop	Year Developed	Project Year									
		PY 1	PY 2	PY 3	PY 4	PY 5	PY 6	PY 7	PY 8	PY 9	PY 10-30
Upland Credit Rice	1	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
	2	0	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
	3	0	0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	4	0	0	0	11.2	11.2	11.2	11.2	11.2	11.2	11.2
	5	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total		7.2	23.0	27.0	38.2	38.2	38.2	38.2	38.2	38.2	38.2
Upland Seed Exchange Rice	1	0	0	0	0	0	0	0	0	0	0
	2	0	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4
	3	0	0	173.9	173.9	173.9	173.9	173.9	173.9	173.9	173.9
	4	0	0	0	173.4	173.4	173.4	173.4	173.4	173.4	173.4
	5	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>208.4</u>	<u>208.4</u>	<u>208.4</u>	<u>208.4</u>	<u>208.4</u>	<u>208.4</u>
Total		0	26.4	200.3	373.7	582.1	582.1	582.1	582.1	582.1	582.1
New Swamp, Single Crop	1	-4.1	20.4	16.1	11.8	14.1	14.1	14.1	14.1	14.1	14.1
	2	0	-20.4	12.7	58.5	70.9	70.9	70.9	70.9	70.9	70.9
	3	0	0	-28.8	82.7	86.1	86.1	86.1	86.1	86.1	86.1
	4	0	0	0	-22.1	52.2	52.2	52.2	52.2	52.2	52.2
	5	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>-27.2</u>	<u>142.1</u>	<u>142.1</u>	<u>142.1</u>	<u>142.1</u>	<u>142.1</u>
Total		-4.1	0	0	130.9	196.1	365.4	365.4	365.4	365.4	365.4
Plus 25% for Double Crop		-1.0	0	0	32.7	49.0	91.4	91.4	91.4	91.4	91.4

Table B-17. Aggregate On-farm Incremental Net Economic Benefits (cont.)
(in thousands of dollars)

Crop	Year Developed	Project Year									
		PY 1	PY 2	PY 3	PY 4	PY 5	PY 6	PY 7	PY 8	PY 9	PY 10-30
New Coffee	1	-32.9	-11.7	4.6	37.3	53.6	78.1	78.1	78.1	78.1	78.1
	2	0	-133.3	-36.6	14.5	117.2	168.3	245.5	245.5	245.5	245.5
	3	0	0	-64.5	-72.9	9.1	73.1	105.1	153.3	153.3	153.3
	4	0	0	0	-41.0	-14.5	5.8	46.5	66.8	97.5	97.5
	5	0	0	0	0	-122.7	-43.5	17.2	139.2	199.9	291.6
Total		-32.9	-115.0	-96.5	-12.1	42.7	281.8	492.4	682.9	774.3	866.0
New Cocoa	1	-10.7	-4.0	-2.1	3.5	11.0	16.7	16.7	16.7	16.7	16.7
	2	0	-85.4	-31.9	-16.6	28.3	88.3	133.7	133.7	133.7	133.7
	3	0	0	-71.2	-26.6	-13.8	23.6	73.6	111.4	111.4	111.4
	4	0	0	0	-87.9	-32.9	-17.0	29.1	90.9	137.6	137.6
	5	0	0	0	0	-166.6	-62.2	-32.3	55.2	172.2	260.7
Total		-10.7	-89.4	-105.2	-127.6	-174.0	49.4	220.8	407.9	571.6	660.1

**Table B-18. Project Area Developed and Cultivated
(in hectares)**

Crop	Year Developed	Area Developed (ha)	Area Cultivated by Project Year					
			PY 1	PY 2	PY 3	PY 4	PY 5	PY 6-30
Upland Credit Rice	1	80	80	80	80	80	80	80
	2	175	0	175	175	175	175	175
	3	44	0	0	44	44	44	44
	4	124	0	0	0	124	124	124
	5	<u>-</u>	0	0	0	0	0	0
Total		423						
Upland Seed Exchange Rice	1	-	0	0	0	0	0	0
	2	244	0	244	244	244	244	244
	3	1,610	0	0	1,610	1,610	1,610	1,610
	4	1,606	0	0	0	1,606	1,606	1,606
	5	<u>1,930</u>	0	0	0	0	1,930	1,930
Total		5,390						
New Swamp Rice	1	74	74	71	56	41	49	49
	2	370	0	370	326	204	247	247
	3	524	0	0	524	288	300	300
	4	402	0	0	0	402	182	182
	5	<u>495</u>	0	0	0	0	495	495
Total		1,865						
Of Which Double Crop (25%)	1		19	18	14	10	12	12
	2		0	93	82	51	62	62
	3		0	0	131	72	75	75
	4		0	0	0	101	46	46
	5		0	0	0	0	124	124

Table B-18. Project Area Developed and Cultivated (cont.)
(in hectares)

Crop	Year Developed	Area Developed (ha)	Area Cultivated by Project Year					
			PY 1	PY 2	PY 3	PY 4	PY 5	PY 6-30
New Coffee	1	105	105	105	105	105	105	105
	2	330	0	330	330	330	330	330
	3	206	0	0	206	206	206	206
	4	131	0	0	0	131	131	131
	5	<u>392</u>	0	0	0	0	392	392
Total		1,164						
New Cocoa	1	30	30	30	30	30	30	30
	2	240	0	240	240	240	240	240
	3	200	0	0	200	200	200	200
	4	247	0	0	0	247	247	247
	5	<u>468</u>	0	0	0	0	468	468
Total		1,185						

Table B-19. Estimated Farm Budgets for the Economic Analysis

Item	Project Year					
	PY 1	PY 2	PY 3	PY 4	PY 5	PY 6-30
<u>Upland Credit Rice</u>						
Yield (kg/ha)	1,460	1,460	1,460	1,460	1,460	1,460
Economic Farmgate Price (\$/ton)	347	347	347	347	347	347
Economic Benefits (\$/ha)	507	507	507	507	507	507
Hired Labor (at \$2.50/person/day)	113	113	113	113	113	113
Family Labor (at \$1.40/person/day)	237	237	237	237	237	237
Seed	27	27	27	27	27	27
Tools	16	16	16	16	16	16
Fertilizers & Pesticides	24	24	24	24	24	24
Total Economic Cost (\$/ha)	417	417	417	417	417	417
Incremental Net Economic Benefits (\$/ha)	90	90	90	90	90	90
<u>Upland Seed Exchange</u>						
Yield (kg/ha)	1,600	1,600	1,600	1,600	1,600	1,600
Economic Farmgate Price (\$/ton)	347	347	347	347	347	347
Economic Benefits (\$/ha)	555	555	555	555	555	555
Hired labor (at \$2.50/person/day)	130	130	130	130	130	130
Family Labor (at \$1.40/person/day)	274	274	274	274	274	274
Seed	27	27	27	27	27	27
Tools	16	16	16	16	16	16
Fertilizer & Pesticides	0	0	0	0	0	0
Total Economic Costs (\$/ha)	447	447	447	447	447	447
Incremental Net Economic Benefits (\$/ha)	108	108	108	108	108	108

Table B-19. Estimated Farm Budgets for the Economic Analysis (cont.)

Item	Project Year					
	PY 1	PY 2	PY 3	PY 4	PY 5	PY 6-30
<u>New Swamp Rice (single crop)</u>						
Yield (kg/ha)	2,230	2,230	2,230	2,230	2,230	2,230
Economic Farmgate Price (\$/ton)	347	347	347	347	347	347
Economic Benefits (\$/ha)	774	774	774	774	774	774
Hired Labor (at \$2.50/person/day)	325	210	210	210	210	210
Family Labor (at \$1.40/person/day)	427	200	200	200	200	200
Seed	22	22	22	22	22	22
Tools	20	20	20	20	20	20
Fertilizers & Pesticides	35	35	35	35	35	35
Total Economic Costs (\$/ha)	829	487	487	487	487	487
Incremental Net Economic Benefits (\$/ha)	-55	287	287	287	287	287
<u>New Coffee</u>						
Yield (kg/ha)	0	0	100	300	400	550
Economic Farmgate Price (\$/ton)	1,719	1,719	1,719	1,719	1,719	1,719
Economic Benefits (\$/ha)	0	0	172	516	688	945
Hired Labor (at \$2.50/person/day)	43	13	18	28	33	40
Family Labor (at \$1.40/person/day)	46	29	41	64	76	92
Seed	155	0	0	0	0	0
Tools	30	30	30	30	30	30
Fertilizers & Pesticides	39	39	39	39	39	39
Total Economic Costs (\$/ha)	313	111	128	161	178	201
Incremental Net Economic Benefits (\$/ha)	-313	-111	44	355	510	744

Table B-19. Estimated Farm Budgets for the Economic Analysis (cont.)

Item	Project Year					
	PY 1	PY 2	PY 3	PY 4	PY 5	PY 6-30
<u>New Cocoa</u>						
Yield (kg/ha)	0	0	50	20	40	55
Economic Farmgate Price (\$/ton)	1,331	1,331	1,331	1,331	1,331	1,331
Economic Benefits (\$/ha)	0	0	67	266	532	732
Hired Labor (at \$2.50/person/day)	58	20	20	25	30	33
Family Labor (at \$1.40/person/day)	64	42	45	52	63	71
Seedlings	163	0	0	0	0	0
Tools	33	33	33	33	33	33
Fertilizers & Pesticides	38	38	38	38	38	38
Total Economic Costs (\$/ha)	356	133	136	148	164	175
Incremental Net Economic Benefits (\$/ha)	-356	-133	-69	118	368	557

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Liberia Rice, Coffee, and Cocoa Statistics

Table B-20. Domestic Rice Production, 1975-1981

Year	Area (thousand acres)	Average Yield (lbs/ acre)	Total Domestic Production ¹ (million lbs of rice paddy)	LPAC Purchases (million lbs of rice paddy)	LPAC Producer Price, Paddy (\$/lb)	Retail Price for Clean Rice, Monrovia (\$/lb)
1975	472	1,068	504	-	0.10	0.25
1976	495	1,091	540	-	0.12	0.24
1977	509	1,128	574	-	0.12	0.23
1978	479	1,120	536	15.4	0.12	0.23
1979	479	1,115	534	11.6	0.12	0.24
1980	479	1,119	536	3.6	0.12	0.24
1981				8.9	0.12	0.24

¹Estimates of domestic rice production vary considerably from source to source.

Table B-21. Rice Imports, 1975-1981

Year	Unit Import Price Clean Rice (\$/lb)	Volume Rice Imports (million lbs)	Value Rice Imports (\$ million)	Rice Imports as % Value of Total Imports	Rice Imports as % Value of Food Imports
1975	0.20	68	14	4.1	38.1
1976	0.16	83	13	3.2	34.1
1977	0.16	123	20	4.3	38.1
1978	0.17	134	23	4.8	40.9
1979	0.16	163	26	5.1	41.1
1980	0.18	191	34	6.4	44.7
1981	0.21	218	46	9.7	48.0

Table B-22. Coffee Statistics, 1975-1981

Year	Coffee Production ¹				Coffee Exports			
	Liberia Total (million lbs)	Lofa (million lbs)	Bong (million lbs)	LPMC Producer Price Avg Annual (\$/lb)	Unit Export Price (\$/lb)	Volume (million lbs)	Value (\$ million)	Coffee Exports as % Value of Total Exports
1975	9.0	5.6	0.5	-	0.50	9.1	4.5	1.1
1976	11.1	4.6	0.5	-	0.71	9.3	6.6	1.4
1977	20.0	5.9	0.8	0.71	1.94	22.2	43.0	9.6
1978	18.4	5.6	0.5	0.78	1.33	19.1	25.3	5.2
1979	18.7	6.8	0.2	0.78	1.50	18.1	27.1	5.1
1980	22.9	10.6	0.6	0.90	1.18	28.0	33.0	5.5
1981 ²	19.3	7.8	0.3	0.73	1.00	24.4	24.4	4.5

¹Equals LPMC purchases.

²1981 data are preliminary estimates.

Table B-23. Cocoa Statistics, 1975-1981

Year	Cocoa Production ¹				Cocoa Exports			
	Liberia Total (million lbs)	Lofa (million lbs)	Bong (million lbs)	LPMC Producer Price Avg Annual (\$/lb)	Unit Export Price (\$/lb)	Volume (million lbs)	Value (\$ million)	Cocoa Exports as % Value of Total Exports
1975	6.1	1.9	1.1	-	0.63	7.0	4.4	1.1
1976	6.2	1.5	1.2	-	0.75	5.5	4.1	0.9
1977	6.8	1.6	1.2	0.64	1.36	4.5	6.1	1.4
1978	7.6	2.3	1.2	0.81	1.62	8.9	14.4	3.0
1979	8.1	1.8	1.3	0.90	1.47	7.5	11.0	2.0
1980	11.5	4.2	1.1	0.90	1.29	8.2	10.5	1.7
1981 ²	11.3	3.3	0.6	0.73	0.90	14.4	12.9	2.4

¹Equals LPMC purchases.

²1981 data are preliminary estimates.

APPENDIX C

SCHISTOSOMIASIS ASSESSMENT:
LOFA AND BONG COUNTIES AGRICULTURAL DEVELOPMENT PROJECTS,
LIBERIA, JANUARY 1982

by Robert W. Roundy

I. BACKGROUND

Both the Lofa County and Bong County Agricultural Development projects include Schistosomiasis Surveillance Units (SSUs). These units are the only elements in the project structures specifically charged with a human public health function. These two units each received the same initial four-fold charge:

1. To collect baseline data in their project areas on the prevalence and, if possible, the intensity of schistosomiasis in rice field workers, school children, and village populations
2. To carry out followup surveys at regular intervals to determine changes in prevalence and intensity of the disease in project areas
3. To study the bionomics of the snail hosts of schistosomiasis in their area
4. To recommend a course of action near the end of Phase I of each project.

Both units are directed from a distance by the Project Director from the Liberian Institute for Biomedical Research; this was initially Dr. Emmet Dennis and is currently Dr. Aloysius Hanson. They are headed on site by project supervisors who have been leading their units since each project's inception: Mr. Momo Horace in Lofa County and Mr. Peter Doetin Vorkpor in Bong County. Total SSU staffs for both projects have numbered 12-15 people since early project years (PY), including the supervising staff, laboratory/field technicians, laboratory/field assistants, secretaries, drivers, janitors, and, in recent years only in Lofa County, a health officer and two health assistants to treat infected individuals.

It is reasonable that SSUs should be organized in these Agricultural Development projects. Throughout Africa, Asia, and Latin America where irrigated agriculture has been encouraged and where forms of schistosomiasis to which humans are susceptible are present, the immense hazards of the disease

have grown to dimensions of public health importance. Before these projects began, Liberia possessed both the appropriate host snails and human forms of infection for two types of schistosomiasis. Schistosomiasis was known to exist in both project counties. In encouraging irrigated agriculture in schistosomiasis-endemic areas there is always the fear that aquatic habitats will be created that encourage host snail populations, that people will be encouraged to come into contact with these habitats and thus be exposed to infection, and that people through their excretory habits will shed disease agents near water habitats and thereby continuously reinfect host snails and encourage the cycle of schistosomiasis infection.

Following are the findings to date on schistosomiasis in these two project areas. These findings are drawn from project and SSU reports; interviews with SSU senior staff, project senior and junior staffs, local medical personnel, and farmers and villagers in the project areas; and field observations undertaken with the USAID assessment team in January 1982.

Two forms of human schistosomiasis exist in the project areas--Schistosoma haematobium, or urinary schistosomiasis, hosted by the snail Bulinus globosus; and S. mansoni, or intestinal schistosomiasis, hosted by the snail Biomphalaria pfeifferi. These two diseases and their hosts are unevenly distributed in the project areas. In general, however, it is clear that the residents of Bong County as a whole are much more heavily infected with both forms of schistosomiasis than are those of Lofa County.

In Lofa County S. haematobium and its host snail are found at variable prevalence and concentration through the project area. Every project district has some endemic level of urinary schistosomiasis. S. mansoni and its host snail are more discrete in their distribution, being found only in Waun Clan, Kolahun District, and throughout the surveyed areas of Zorzor District.

In Bong County three fairly discrete areas of schistosomiasis endemicity appear to exist. In one area, roughly from the border with Montserrado County to the town of Totota, neither host snail is found. Infections for both forms of schistosomiasis exist in this region and are presumably associated with mobile people infected elsewhere. In the next area, from the town of Gbonkonima to the town of Gbatata, only B. globosus, the host of S. haematobium, is found. Urinary schistosomiasis prevalence far exceeds that of intestinal schistosomiasis. The last area, from Gbondoi to the Nimba County border, possesses host snails and high prevalences for both forms of schistosomiasis.

In both counties, schistosomiasis infection rates, determined by the presence of eggs in urine or feces, vary by age and occupation. The age-specific curve for the counties is the globally expected curve, with low but ascending rates in youth, peak rates in the teenage years, and generally declining rates from the twenties to old age. For any given community, prevalences are highest for school children. The next highest prevalence hazard by surveyed occupation is for swamp farmers. Other groups studied by occupation include villagers, with variable prevalences, and junior-level project field staff and Agricultural Extension Aides (AEAs), who tend to low prevalences. There is no apparent significant sex difference in prevalence.

It is impossible at this time to determine if schistosomiasis prevalence has changed in the period of the projects. With just a few years of activity this would be difficult to recognize, and it is further complicated by poorly defined control populations to monitor through time as well as changing methods of surveillance in Lofa County.

It is also impossible to determine the significance of schistosomiasis infections to perceived human health in the projects. Morbidity is described as ranging from nondistinguishable to periodically debilitating. Debilitation may also be associated with advancing age. One medical doctor interviewed suggested that urinary schistosomiasis is a significant source of debilitation and pathology in the Zorzor District of Lofa County, and also may be associated with mortality there from bladder cancer.

General host snail distribution in the project areas is given above. Two major types of collection sites are surveyed by both SSUs--the rice swamps developed by the projects and other traditional water contact sites. Host snail species can be found at both types of sites. It is reported that in Lofa County development swamps snail populations explode soon after natural swamps are converted into wet-rice fields. Bong County swamps apparently are colonized more slowly.

On an annual cycle there is a known fluctuation of snail populations in both counties. Snail densities, measured by molluscs collected per man per minute, are highest in the dry season of the year, roughly October to February. In the rainy season snail collection can be quite sparse.

There is also preliminary evidence that there might be a long-term trend for snail populations in rice swamps. In Lofa County at the Selega Swamp, an area of intensive use by the project for seed replication, agronomic experiments, and training, there has been evidence of a decline in snail population. Presumptively, this decline has been attributed to high

inputs of fertilizer and pesticides over the project period. Other possible factors include the constant weeding of swamp canals and the periodic drying and flooding of swamp canals. This phenomenon is certainly worthy of further study, and its occurrence should be monitored in less intensively used swamps.

Snails shedding the cercariae of human schistosomiasis are more discrete in their distribution. Such snails are most commonly found in water contact sites that predate the projects, which is to be expected given longer and more intensive human contact in a smaller water site. To 1981, 114 rice development swamps in Bong County had been surveyed for snails. Agricultural use of very few of these swamps predates the project. Of these swamps, two possessed snails shedding S. haematobium cercariae, and four shedding S. mansoni cercariae. In Lofa County, 256 project swamps were surveyed to 1981. Three of these swamps, all having been used for traditional swamp rice production prior to the onset of the project, possessed snails shedding S. haematobium cercariae. To date, therefore, newly developed project swamps have been of little significance to schistosomiasis epidemiology.

As with snail populations, there is a temporality in the concentration of cercariae-shedding snails. Generally at the same period that snail populations are highest, the dry season, the proportion of infected snails is also highest.

The traditional water contact sites appear to be the places of greatest disease transmission. These are frequently ponds along stream courses where people bathe, wash clothes, wash dishes, gather domestic water supplies, and fish. These activities may be organized so that conflicting uses are undertaken in separate ponds. All of these activities are likely to include human body immersion into the ponds, thereby exposing skin to cercarial penetration.

Project swamps are also beginning to be utilized for traditional water use. From written reports, interviews, and field observations it is clear that canals through some of the swamps are used for washing and bathing sites and, on occasion, become the source of domestic water. This development increases the likelihood of developed swamps becoming transmission sites.

II. SCHISTOSOMIASIS SURVEILLANCE UNIT ACTIVITIES

The reactions of the project SSUs to the above findings have been fourfold. They have maintained surveillance of water bodies and human populations, arranged or provided treatment for infected individuals, given warnings about the potential

hazards of swamp farming to local populations, and provided some health education about schistosomiasis prevention and recognition. A fifth reaction, mollusciciding to destroy snails, has only been attempted experimentally in Bong County as part of a broader public health investigation.

A. Schistosomiasis Treatment Programs

Infected individuals are identified in two ways. Some are identified in the process of surveillance, others because they recognize their symptoms (usually bloody urine with S. haematobium) and seek out assistance. Those people providing urine or stool specimens in surveys and found negative for schistosomiasis infection are supposed to be so informed via a message from the SSU passed through their AEAs.

Infected individuals identified by surveillance are provided with a treatment program arranged by the SSU in Lofa County. The unit currently estimates that it can relocate and treat about 75 percent of those identified as infected. Most of the remainder have left the area between the time of surveillance and the beginning of treatment. Earlier in the project, individuals found to be infected were referred to clinics or hospitals for treatment. This process was judged a failure. Several reasons may have contributed to this failure: people did not use their referrals to seek treatment, health facilities lacked the requisite drugs, or fees for such services were being charged to the individuals who therefore rejected treatment.

Infected individuals who diagnose themselves are expected to report to their local AEA who is then expected to assist the individual in contacting the project SSU. If the person is found positive for schistosomiasis, treatment will be provided. From one farmer's description, this process appears to function as planned, at least on occasion. In interviews, some people who suspected that they had schistosomiasis reported doing nothing about it because of their fear that they could not afford treatment.

Followup to assess the results of treatment is rare. In general, SSU supervisors believe that those patients with low worm infections may be completely cured while those with heavier infection experience a reduction in worm burden and egg output. After one treatment experience in a single town in Bong County, a resurvey showed a 15.2 percent cure rate and a 72.9 percent reduction in schistosome egg output in treated individuals.

Warnings about the hazards of schistosomiasis were conveyed to villagers in the early stages of the projects. In Lofa County, such warnings were perceived by some to spread more alarm than prevention. Only in 1981 did Lofa County receive some personnel for project-directed treatment and a health education program. The Bong County SSU sees a need for the same kind of increase in staff to fulfill its obligations to project-area residents.

The farmers' reactions to schistosomiasis-related activities in the programs have been varied; they have included increased fear and worry, a possible increase in the attribution of all ills to work in the swamps, and enhanced aspirations for improved and continuous programs for disease treatment.

In interviews, farmers over and over recited their concern about exposure to schistosomiasis in their work in the swamps. If they themselves did not claim active symptoms of infection, they frequently said they knew someone who did have them. They could recite accurate symptoms for urinary schistosomiasis; only once, from a nonproject-affiliated farmer, were the symptoms described obviously those of some other affliction.

Besides schistosomiasis, other ills were attributed to swamp work. These included complaints that sounded like rheumatism or arthritis; edema and other swellings; itching that may be associated with cercarial dermatitis; flareup of pre-existing malaria infections; other fevers, chills, and numbness; and assorted bodyaches. While admittedly leading questions about illness and swamps were eventually asked of many respondents, none of them took the opportunity to attribute ills except accidents with tools to any of their nonswamp agricultural activities.

As a consequence of the project, farmers are making greater demands for health care. In four separate community-level discussions, a high-priority request was for a functioning local clinic for which construction through self-help was offered (in one case completed, in another in progress) and a willingness to pay for drugs stated. In both counties, senior staff of the projects have declared that the farmers have higher aspirations for treatment than can now be provided. It should be recognized, too, that the village interest is in curative, not necessarily preventive, medicine.

B. Well and Latrine Construction

Besides the SSUs in the Project Management Units (PMUs), the divisions charged with well and latrine construction may also play a role in schistosomiasis control. The provision of wells can decrease surface water contacts and thereby reduce exposure to infection. The provision and proper use of latrines can control the shedding of schistosome eggs from infected individuals, thereby disrupting the infection of snails.

Both county projects have made significant efforts to provide safe wells to local settlements. To date, the Lofa County project has constructed about 160 wells with handpumps, the Bong County project about one-quarter that number. In the towns that were visited, people said they want a well or, if they already have one, more wells. Some also reported preferring well water to old surface sources for domestic consumption.

Both projects also provide maintenance services for their wells. In Lofa County, local villagers have been trained to provide simple maintenance. This is not done in Bong County because the pumps require sophisticated tools for servicing.

To date, all wells and pumps in Bong County are reported to be functioning. Breakdowns are quickly repaired by project workers. The situation in Lofa County is not as satisfactory. This project procured less expensive pumps. As a consequence, they are experiencing breakdowns requiring parts replacement after about one year of use. The pump supplier in Monrovia has not been able to procure spare parts from the overseas manufacturer of the pumps, so now approximately one-half of all project-installed pumps in Lofa County are not working. One well that was seen in a field was said to have been out of order for over a year. Townspeople have expressed great concern over the failure to receive timely repair of these pumps.

Even when pumps are working, the provision of wells does not guarantee that old water contact sites will be avoided. Today well water is used primarily for domestic water supply and some bathing. Clothes are still often washed at ponds and streams. Also, at one farmstead it was observed that water was collected for domestic use at both a protected well and an unprotected spring, thereby negating any guarantee of safe drinking water.

The same division in each project that is responsible for well construction is also responsible for building community latrines. Prior to the projects, the common toilet for most

households was the bush or stream, although some families did have private latrines.

The latrines constructed have been communal latrines requiring self-help labor and the provision of some construction materials. These latrines have not been well supported by the communities, leading to consequent delays in completion and the inability to construct as many as planned. As latrines are put into use, new problems arise. The latrines are meant for the community, but that means no individual is responsible for their upkeep. The result in many cases has been ill-kept latrines that themselves can be a focus of disease transmission. In some cases locks have been placed on latrine doors so they may be used only by specific individuals or reserved for visitors to the towns.

III. ASSESSMENTS AND RECOMMENDATIONS

Based upon the above findings, the following assessments and recommendations relevant to schistosomiasis in the Lofa and Bong Counties projects are made.

A. Assessments

1. One initial term of reference for project SSUs was to collect relevant baseline data. Such data are not as complete as desirable, have not been collated so as to make them easily interpretable, and, in the case of Lofa County, were collected with changing terms of reference so there is no continuity of study populations.

2. Another SSU activity was to be regularly conducted followup swamp surveys. In both counties, sample swamps were selected and periodically resurveyed, but no explanation was given as to how these sites were chosen nor has an evaluation document from long-term studies been prepared.

3. A third activity was to conduct bionomic studies of the host snails. Annual population fluctuations and infectivity rates have been studied and reported; however, no attempts have been made to assess the role of project swamp use procedures on snail survival and infection rates. This would include controlled studies of the influence of agricultural chemicals, of single-cropping vs. double-cropping of rice fields, and of periodically draining wet fields completely.

4. A fourth charge was to recommend future courses of action. No such recommendation was seen in this assessment.

Other items assessible in the projects include the following:

1. Making an early decision to begin SSUs in Project Year 1 instead of Project Year 2 as originally planned. This is highly recommended for this and other similar projects if any kind of baseline data are to be gathered.

2. The decision to make the SSU the only specifically health-oriented division in both projects. This was an unfortunate decision, as a small increment of resources and effort with basically the same personnel could have yielded advances in project population health across a broader spectrum, including, especially, improvements in the areas of hygiene, food- and water-borne diseases, environmental health, and nutrition. Such efforts could be centered in an expanded SSU, but should also be well integrated into other appropriate divisions including training, extension, well and latrine construction, agricultural research, and agricultural implementation.

3. The decision to emphasize surveillance, snail bionomics, and treatment in SSU programs. This is a worthy program, but it should be supplemented with a study of social aspects of disease, locally appropriate technologies to overcome hazards to health, and early integrated health education programs presented as a positive increment to the projects' general training and extension programs.

4. Assessment of special funding of SSUs in an integrated development program. The SSUs are funded at about \$100,000 per year in Lofa County and \$50,000-\$55,000 per year in Bong County. This compares to a 1979 national Government of Liberia Ministry of Health and Social Welfare budget of about \$25.8 million, only about \$2 million of which went for preventive medicine. Given these numbers, it is unlikely that the national program responsible for health could fund these SSU programs if they were separated from the projects. Furthermore it is unlikely that the SSUs could be integrated into the national Ministry of Health and Social Welfare at anywhere near their present scale. Therefore I conclude that special funding is necessary and shall continue to be needed as swamp rice developments age and increase their potential as transmission sites and as SSUs consider expanding their efforts into schistosomiasis prevention and health education. It also appears necessary that the SSUs implement locally sustainable health-oriented practices in project populations (such as water control, site avoidance, hygienic practice) prior to the demise of the projects if the SSUs are to have any lasting local influence besides that of baseline data gatherers.

B. Recommendations

Recommendations are made in two areas: recommendations for action and recommendations for further research. Any action recommendation should, of course, first be assessed for its appropriateness to local populations and environmental situations. Some of these acts are already engaged in by some people in the project areas--it would be worthwhile to find out why and assess the potential of their diffusion to others.

1. Recommendations for Action

1. Integrate SSU input more thoroughly into other project divisions. Views on hazards, disease prevention, treatment, and environmental aspects of health can be integrated into programs in training, extension, agricultural packages, and well and latrine construction.

2. Train and, as possible, control swamp rice farmers so that swamps are used only for rice production. Discourage all other water contact activities for the time being.

3. For wells and pumps, integrate two counties so they have the same technical systems and can support one another's spare parts and technician needs.

4. Seek out and use a water-lifting device for wells taking into account the need for reliability, stamina, availability of spare parts, and serviceability at the local or county level, even after special project assistance ends. This might mean encouraging local tradesmen or cooperatives to stock parts and training skilled craftsmen who can locally fabricate usable spare parts for pumps. This might also mean considering a tradeoff between high hygienic levels for water and reliability of access to water, specifically the replacement of hand pumps by buckets on a rope if pump maintenance programs appear inappropriate to local situations. If such a tradeoff is made, it requires redesigning wells for maximum possible protection and a well-use education program for villagers of all ages.

5. Where feasible, wells should be constructed in areas with space for clothes-washing facilities and space for drying. Because wells are generally closer to settlements than are traditional ponds, it may be possible to redirect water use away from hazardous ponds. Wash areas could be constructed relatively inexpensively from concrete, stone, wood, and corrugated iron to be used as scrub surfaces.

6. Encourage bathing areas at home. This is already occurring in some areas, with wash water drawn from the well. People seem to appreciate heated baths and this should be encouraged by the project as it implies carrying water to the home and perhaps killing any cercariae in the water in the heating process. However, some towns may be too densely settled for this use of space in private homes.

7. Encourage private rather than communal latrines. Private latrines are more likely to be used and kept up, thereby disrupting schistosomiasis cycles and cycles of other intestinal parasites as well. Again, some towns may be too densely settled for this use of space in all households, using currently available technologies.

8. Formulate and advertise formal schistosomiasis treatment programs so people will not avoid them for fear of the cost. If these programs have a charge for medicines, this should be well advertised and its purpose explained; people appear willing to pay for such services if they understand the reason and find the service reliable. Treatment staff most likely would operate within the SSU initially, although long-run integration into county or local health services is needed.

9. Encourage health education programs in training and extension services that go beyond schistosomiasis. Add training in prevention, discovery, and treatment of other hygienic and infectious disorders, and especially in nutrition education.

10. Whatever else is done, each of these recommendations should be acted upon only after careful discussion and testing and then only with an accompanying education program.

2. Recommendations for SSU Research

1. The current emphasis in prevalence surveys and treatment programs is on school children because they are prime excretors of eggs. The role of school-age children in transmission cycles needs to be verified through water contact studies and excretory behavior studies to determine whether they warrant all this attention from an epidemiologic standpoint. This sociocultural research on students and other local groups should be based upon observation studies of water contact and toilet practices of the type recommended by the World Health Organization Tropical Disease Research program and practices in other parts of Africa by such researchers as Dalton, Kloos, and Polderman. It should be possible, at small expense, to use students from the University of Liberia, the Rural Development Institute at Cuttington College, or other such institutions in

Liberia for such studies, assuming that they would receive proper training for their project and that their institutions would treat it as a practicum/research project integrated into their own curriculum.

2. Improve snail bionomic studies in certain environments using controls. Study swamps with controlled fertilizer and pesticide use, single-cropped vs. double-cropped fields, fields that are periodically drained, and fields that are better engineered and maintained so as to assess the possibility of using engineering controls of swamp rice schistosomiasis.

3. With the Evaluation Unit, investigate cost- and agro-nomic-effectiveness of any procedures designed to control or disrupt snail populations. For some potentially useful procedures, such as land engineering, assess possibilities against a probable labor-supply constraint. There is also a need for education programs with farmers.

4. Assess whether transmission is highly seasonal, as the annual snail figures suggest, which would allow a seasonal round of SSU surveillance, treatment, and education activities that is more productive and would free resources and personnel for other activities during the remainder of the year.

5. Assess the role of clothing in schistosomiasis protection. AEAs have low reinfection rates, perhaps from wearing high rubber boots in swamps.

6. Assess the role of latrines, communal and private, in disease transmission and prevention.

7. Assess the role of migrant laborers in spreading infection. They are difficult to find and to treat. It is known that there are areas with infection but no snails, which implies diffusion of infection. In Bong County, local snails appear to be more susceptible to local strains of schistosomes, which may perhaps control this diffusion phenomenon somewhat.

APPENDIX D

HEALTH ASPECTS BEYOND SCHISTOSOMIASIS IN THE LOFA AND
BONG COUNTIES AGRICULTURAL DEVELOPMENT PROJECTS,
LIBERIA, JANUARY 1982

by Robert W. Roundy

In planning and implementing the Integrated Rural Development projects in Lofa and Bong Counties a great opportunity to directly influence the overall health of project populations was allowed to slip away. It was appropriate to recognize schistosomiasis as a potentially great problem that would be generated by the swamp rice development aspects of these projects and to integrate a specific Schistosomiasis Surveillance Unit (SSU) into the Project Management Unit (PMU) of each project from the beginning. It is unfortunate, however, that the talents of the SSUs were not adequately utilized to assess other health problems and that other departments in the PMUs, notably training, extension, wells and latrines, cooperatives, agricultural research, and agricultural implementation, have not integrated health-related research, education, and infrastructure into their own programs to their full potential.

Schistosomiasis was emphasized because this disease is recognized as a hazardous consequence of irrigated agricultural developments throughout much of Africa, Asia, and Latin America. Engineering landscapes, controlling water supplies, and encouraging human-water contact all encourage the survival of schistosome disease agents and their aquatic snail hosts and the success of the cycling of these agents between snails and humans. Rightfully, the Lofa and Bong Counties projects were seen as potentially increasing the pre-existing problem of schistosomiasis for project populations. The Government of Liberia and international donor agencies were correct in making the substantial contribution required to run the SSUs in each project so as to be sure that agronomic and economic gains were not offset by health losses over the life of the projects.

However, the surveillance, treatment, and education roles of the SSUs have been circumscribed to a level far below their true potential. Talented and active field and laboratory personnel are only assessing and reporting upon the two forms of locally existing schistosomiasis, Schistosoma haematobium and S. mansoni, and their respective host snails, Bulinus globosus and Biomphalaria pfeifferi. With minimal extra effort much more health-related information could be gathered, assessed, and worked into health improvement and education programs appropriate to the needs of project populations.

Following the suggestions of A.A. Buck,¹ the surveillance units could use the urine and stool specimens they already collect to assess the prevalence of infections other than schistosomiasis. This would entail little extra monetary cost in the case of intestinal helminths. Indeed, both SSUs already survey collected stools not only for S. mansoni but also for hookworm (reported as Ancylostoma duodenale), Ascaris lumbricoides, Trichuris trichiura, and Strongyloides stercoralis, using the same preservative, staining, and microscopy techniques to identify all of these agents.

Records are kept for all of these infections, but assessments for only the two schistosomiasis appear regularly in project and SSU quarterly and annual reports. Adding assessments and evaluations of these other helminths to reporting cycles could tell project personnel, local health practitioners, and local populations much about personal and environmental hygiene, the need for the washing and proper preparation of foods, and the importance to good health of proper disposal of human feces. Such information could be added to already existing training and extension programs and encourage well and latrine construction and maintenance.

At additional cost, the SSU could provide further surveillance information relevant to good health. Through additional preservation and staining techniques, further information on intestinal protozoal infections could be garnered from stools already collected. The significance of such presumably present afflictions as amebiasis and giardiasis could be assessed, and preventive and curative programs implemented. At much further cost, bacterial infections such as shigellosis, salmonellosis, and cholera might be monitored via stools. Furthermore, the talents of the personnel of the SSUs might be used to perform coliform counts in domestic water supplies, thereby monitoring well and other water source quality. In their snail collections, the SSU workers could be trained to recognize snails associated with diseases other than human schistosomiasis, such as hosts of liver flukes of domestic animals. SSU snail collectors might also be trained to collect insect larvae to assess the bionomics and distributions of arthropod-borne diseases.

Some of these suggestions are very practical and add immediately usable health improvements to the project populations.

¹A.A. Buck, R.I. Anderson, A.A. MacRae, and A. Fain, "Epidemiology of Poly-Parasitism. I. Occurrence, Frequency and Distribution of Multiple Infections in Rural Communities in Chad, Peru, Afghanistan, and Zaire," Tropenmedizin und Parasitologie 29 (1978) 61-70.

Others are probably too purely research oriented and too costly to be implemented by an integrated rural development project. But each suggestion should be assessed for its ability to more fully and properly use already existing personnel and resources in these and similar future projects.

So far, this assessment has considered only infectious/parasitic diseases as objects of surveillance, treatment, and education. It is possible, especially in this UN-designated International Drinking Water Supply and Sanitation Decade, to reorient this interest from specific diseases to disease-associated environments, namely water.

The provision of sufficient quantities of water of adequate quality to populations in these project areas is probably the single most significant route to improved standards of local health. Such provision should be undertaken through the combined efforts of PMU divisions of training, extension, well and latrine construction, and SSUs.

Following the organization of White, Bradley, and White,² water quality, quantity, and reliability of supply are health related in four different ways:

1. Water quality is important to the control of water-borne diseases, such as bacterial dysenteries and cholera. To control these diseases the integrity of domestic water supplies must be assured.

2. Water quantity is important to the control of water-washed diseases, where water can be used to promote personal and environmental cleanliness. The amount of water available is more important than its quality. Reliable supplies of water can aid in the control of skin infections such as scabies and yaws and aid in hand and food washing so as to reduce the hazards of the soil-transmitted helminths, A. lumbricoides and T. trichiura.

3. Controlled and reliable supplies of water may reduce exposure to water-related diseases. These are diseases associated with mobile vectors that breed in association with surface water bodies, such as malaria, onchocerciasis, and trypanosomiasis. Safe water supply may restrict contact with some of these vectors, either through the destruction or avoidance of their breeding sites. Malaria is common throughout the project areas and is probably unavoidable short of a West African

²Gilbert F. White, David J. Bradley, and Anne U. White, Drawers of Water: Domestic Water Use in East Africa, University of Chicago Press, 1972.

regional control program. Onchocerciasis is apparently common throughout both project areas, although seemingly without much occurrence of its main associated pathology, blindness. Trypanosomiasis was unreported in Lofa County and very rarely diagnosed in Bong County.

4. Provision of protected water can yield reduced contact with water-based diseases, of which schistosomiasis is the prime example. These are diseases transmitted during physical contact with water.

In understanding and using these disease-water associations, the PMU divisions listed above can integrate their already existing activities so as to assess the significance of local hazards to health; prepare a disease prevention program; construct the necessary facilities and infrastructure for that program; maintain a supply of necessary equipment, spare parts, and tools; educate local populations as to the values of such programs; and train these populations in practical ways to maintain the programs after the formal projects end. Most of these suggestions can be integrated into the existing projects at little added expense or need for additional personnel. The projects could have been better designed both to use existing programs to provide the schistosomiasis component of the PMU and to more effectively integrate other divisions into a wider ranging health component.

In another area of disease etiology, deficiency diseases, existing divisions of the PMU could make significant contributions to local nutrition with some added effort. Based on the inhabitants' visual appearance and on discussions with local health personnel, it seems that rural nutrition in the project areas is average and, in normal times, within acceptable limits. Protein and some vitamin consumption levels may be suboptimum, but appear to present no apparent great risk based upon lay-person observations.

Project agricultural personnel could make two major contributions in the area of nutrition. In creating their agricultural package, they could include some emphasis upon products besides the current swamp and upland rice, coffee, and cacao. This would include the encouragement of the currently acceptable tubers and greens from cassava and sweet potatoes; chili peppers; plants from the family of tomatoes, eggplant, and bitter balls; cocoyam (eddoes); groundnuts; beans; and local fruits for domestic consumption and market. Some efforts in this direction are already reported in both counties with the encouragement of vegetable farming on the hills around swamps that are developed for rice cultivation. Furthermore, the agricultural experimentation division can test and distribute more productive varieties of these crops under local cultivating practices, thereby yielding increased output for the

same effort. There are already efforts in this direction in cassava research in Lofa County. This second suggestion calls for research by the projects, but it is research that should yield fairly quick, applicable, and appropriate responses.

The training and extension divisions can add to nutritional well-being through education programs. These can include training components on basic nutrition based upon locally available and accepted foods; demonstrations on the preparation, consumption, and value of locally produced but underutilized foods (grapefruit and possibly papaya come to mind here); and special units on maternal, infant, and child feeding practices.

In regard to this last suggestion, it has been noted that project rural populations already practice sound infant feeding. Breastfeeding is accepted, encouraged, and practiced; babies are breastfed from infancy to, at declining rates, approximately two years of age.³ Should such practices ever come under commerciogenic assault,³ project personnel should be prepared to launch infant feeding training and extension programs to counterattack. Only one instance of bottle feeding of infants was seen in the two project counties, and that was in a major town. On the other hand, provision shops in all major towns carry supplies of tinned infant formulas, baby bottles, and nipples; from their shelf condition compared to other items on display, they appear to enjoy a good turnover.

There is a strong likelihood that improvements in the quality of weaning foods would be a useful addition to local nutrition. Evidence from The Gambia⁴ indicates the probability of such food becoming a source of infection to young children under West African environmental and behavioral conditions. This research also indicates, however, the possibilities for keeping this food hygienic and for basing such foods upon nutritionally sound combinations of locally grown and acceptable products. From the beginning, the projects could have included a program that combined the talents of the agriculture production, training, and SSU sections of the PMUs to encourage and teach proper production, preparation, and feeding of weaning foods.

³D.B. Jelliffe, "Commerciogenic Malnutrition?," Food Technology 25 (1971) 55.

⁴M.G.M. Rowland, R.A.E. Barrell, and R.G. Whitehead, "Bacterial Contamination in Traditional Gambian Weaning Foods," The Lancet (21 Jan, 1978) 136-138.

Another health hazard area not specifically planned for by the projects is accidents. The training departments of the PMUs have been training AEAs in the safe operation of motor-cycles. They could also train farmers in the safe use of new tools and the proper ways to perform new tasks. Project populations are subjected to new activities such as well and latrine digging and swamp engineering. These activities may be more strenuous or very different from traditional manual labor. Training in proper techniques is warranted.

Another area of safety training could be undertaken in association with road development. Towns in both project counties that were once isolated are now serviced by rural feeder roads. Programs on road safety for all inhabitants could be useful in preventing accidents.

Another hazard newly generated by the projects is that of toxic poisoning. The agronomic packages, especially that for swamp rice, include the use of pesticides and herbicides. Intensive training and extension programs in the use, storage, and side-effects of these chemicals are warranted. To date, low quantities of pesticides appear to be used in the projects. There is also conflicting evidence as to how willing farmers are to accept credit for these inputs. And also, no medical personnel to whom inquiries were made had ever heard of a case of agricultural chemical poisoning in Liberia. But chemicals such as Diazinon in the hundreds of kilograms, Lindane and more recently Dieldrin in the tens of liters, and MCPA in a few liters, are being used annually in the Lofa and Bong Counties project districts, mainly on swamp rice, and health-oriented training in their use should be stressed.

Finally, a last health-associated problem has appeared in some areas of Lofa County in association with swamp rice development. Farmers are complaining about attacks from leeches in their swamps. Responses to the leeches are as strong as demands for chemical controls and the abandonment of some swamps. PMUs must take responsibility for the control of leeches. Preliminary farmer-discovered evidence suggests the possibility that periodic drying of swamps, the wearing of protective socks in the swamps, and the smearing of feet and legs with palm oil before working in the swamps may control leeches or reduce their attacks. Further applied research is obviously necessary if some project gains are to be saved.

Throughout this assessment of the health aspects of the Lofa and Bong Counties projects the emphasis has been upon the following factors:

1. The lost opportunities to influence health through structures that already exist in the projects

2. The potential for project departments to collaborate in efforts to enhance health

3. The prevention of disease through training, avoidance, and behavior modification rather than the curing of disease after it appears

4. The encouragement of existing well-adapted behaviors, the suggestion of other behaviors that would fit pre-existing cultural norms, and the discouragement of new, maladaptive behaviors

5. The planning of health improvements that can be accepted and maintained by local populations even after the termination of the projects

I have argued for better use of all resources available from the beginning to these projects and others elsewhere in the world. The initial implementation of such projects should take all of these suggestions into account, picking and choosing specific suggestions on the basis of local needs, resources, and hazards.

Health for local populations in the Lofa and Bong Counties Agricultural Development Projects was too narrowly defined from the beginning, given the resources and personnel available to the projects. More innovative and integrative activities would better serve the project populations--better serve them immediately, better serve them in the long run, and better serve them cost effectively.

Looking at these suggestions and their possibilities for inclusion in the Lofa and Bong Counties projects, I am drawn to a further conclusion. It is probable that such expansion of the areas of health influences in integrated rural development projects would be viable in some projects and an unmanageable burden for others. My impressions from the limited time spent with the staffs of the two projects are that the Lofa County project PMU could have assessed the local value of each of my suggestions from the beginning of the project and integrated those suggestions of local viability into their efforts in a timely manner. In early 1982, the evidence on site was that the various divisions of the PMU communicated with and supported one another sufficiently well that such integrated activities in the health field could succeed. In the Bong County project in early 1982 this did not appear to be the case. At this stage in the Bong project it is likely that the suggested integrated activities would not succeed and would only add to the burdens of project implementation.

These differing situations in the two projects are apparently idiosyncratic and unpredictable. I am therefore drawn to

the conclusion that my suggestions for integrated health activities should be recognized as possible areas of effort from the beginning of such projects, but integrated into the projects only as the projects appear capable of supporting the activities. Therefore, they should be seen as potential areas of integration rather than obligatory ones. They are areas that will be developed only as the local ability of the PMU, junior field staff, and project-area residents to use them evolves. Some future integrated rural development projects, such as that in Lofa County, may get to these evolved health inputs quickly. Other projects, unfortunately, may never be able to integrate most of these inputs into their structure.

APPENDIX E

AGRICULTURE RESEARCH AND EXTENSION COMPONENTS OF THE
LOFA AND BONG COUNTY PROJECTS

by Robert I. Jackson

I. AGRICULTURE SECTOR

The population of Liberia is estimated to be 1.8 million, 70 percent of whom are living in rural areas and primarily engaged in agriculture. If the annual population growth rate of 3.3 percent continues, it will result in a doubling of the population at about the turn of the century.

The climate and soils are generally suitable for the cultivation of a range of tropical crops which include rubber, coffee, cocoa, oil palm, rice, cassava, and some fruit and vegetable crops. The tree crops are grown for the export market, with the exception of oil palm from which only the palm kernels are exported. Due to the decline in world market prices for rubber, many of the trees are not tapped. Prices for cocoa and coffee have declined recently, but appear to have little or no immediate effect on the production of new plantings of these two crops.

The two most important food crops for the Liberian farmers are rice and cassava. Rice is far more important in the diet than cassava, and consequently the farmers' first concern is the production of rice to meet the needs of their families. About 95 percent of the rice is grown on the uplands as a rain-fed crop and the remaining 5 percent is produced in the swamps. Some fruits and vegetables are grown for home consumption and the local markets. Sugarcane is cultivated near the swamps for the production of cane juice which is fermented and distilled into an alcoholic beverage.

The topography can best be described as moderately undulating uplands, dissected by valley bottoms or swamps. The uplands are used for rice cultivation under the traditional system of slash and burn or shifting cultivation. Tree crops are also grown in the uplands. The soils are generally quite acid and low in fertility. The more gravelly soils are used for cocoa production because of their suitability for root penetration. Coffee is grown in the areas where the soils are more shallow. The swamps are imperfectly-to-poorly drained, sandy-to-sandy-clay loams, very acid, and of relatively low fertility. It is in some of these swamps that rice is grown as lowland rice.

Shifting cultivation in the uplands is the predominant system used for the production of food crops. This system consists of the filling, burning, and partial clearing of secondary forest followed by one and sometimes two or three years of cultivation, after which the land reverts to bush fallow for 7 to 10 years. During the first rainy season following the dry season when clearing is carried out, upland rice is planted. Where soil fertility is satisfactory at the end of the first crop year, such crops as cassava and peanuts may be planted during the second and third years. After this time the land reverts to bush fallow. At least 10 years of fallow have been common in the past, but as land pressure increases, the fallow period is decreasing to five to seven years.

The area cultivated by farm families varies from 2 to 20 acres. The farm family comprises approximately 5.5 persons which is a potential labor force of 2.6 labor equivalents per average farm family. Most farm families would use about 250 persondays each year to cultivate about three acres of upland rice. The remaining 350 persondays each year are used for the cultivation of other food and tree crops, and swamp development. Hired labor is generally required for the clearing of the swamp, land leveling, and building water control devices such as bunds and canals.

A. Project Description

The Lofa County Rural Development Project was initiated in 1976 to extend for five years. An AID loan for \$5.0 million was authorized along with an IBRD credit for \$6.0 million. The Government of Liberia (GOL) contribution was \$5.9 million, and the farmer contribution of \$1.1 million completed the financial plan for a total of \$18.0 million.

A similar project was funded for Bong County at an estimated cost of \$20.3 million to be implemented over the five-year period 1977 to 1981. AID authorized a loan for \$6.6 million. The GOL's contribution was \$6.7 million, and the IBRD authorized a credit of \$7.0 million.

B. Project Objectives

The purpose of the two county projects is to increase agricultural production and productivity for rice, coffee, and

cocoa on small farms. This appendix will address two of the aims of the projects:

1. To provide training to extension staff and farmers in the use of the new input packages, along with training in improved methods of on-farm processing
2. To develop an extension and land development service to provide on-farm assistance in the application of the technology

II. AGRICULTURAL RESEARCH

Technical packages to be extended to farmers must be based on sound and adequate research to ensure that the packages are agronomically sound and that they will benefit the farmers economically. If the technical package is put together without a sound foundation, the farmers will quickly become disillusioned and neither seek nor follow the advice of the extension service. They will revert to their former practices or modify the package to meet their needs.

The Project Paper for the Bong County project was prepared several months after the one for Lofa County, and little had changed in research in Liberia during this short duration. It is extremely difficult to understand how a project could be designed and approved knowing that the agricultural research program in Liberia was so weak and that it had very little to offer for designing a technical package. The following paragraph on the dismal state of agricultural research is taken from the Project Paper for Bong County:

Agricultural research in Liberia lacks proper direction, planning, implementation, and coordination. Consequently, past efforts have been ineffective and constraints have been both organizational and financial. The Central Agricultural Experiment Station [now the Central Agricultural Research Institute] is poorly staffed, has limited physical facilities, is inadequately financed, and lacks the administrative and financial capacity to organize effective research.

The following two contradictory statements appear in the Lofa County Project Paper: "The [Bank Economic] Mission also concluded that any successful strategy in Liberia would need to be regional because constraints and ecological conditions differ between the coastal belt . . . and the rural interior where the majority of the population lives cut off from the coastal cities" Just two pages later is the following statement: "There is little or no research for coffee, cocoa, and

oil palm but data is available from other West African countries with similar ecological conditions." It is extremely doubtful that the ecological conditions within Liberia vary as greatly as those between Liberia and other West African countries. The evaluation team learned that the recommendation for rates of fertilizer application for coffee were those of Kenya! In another discussion, it was found that the coffee seeds imported into Liberia from the Ivory Coast were seeds of doubtful origin and thus carried no assurance of being improved varieties.

At the time of implementation of the Lofa project, the Liberian Produce Marketing Corporation (LPMC) was responsible for raising and distributing the cocoa and coffee seedlings for the project area. This turned out to be an unsatisfactory arrangement. The Plant Production Unit (PPU) was then established within the project itself to supervise its own coffee and cocoa nurseries. At the same time, it was realized that better agricultural research information should be developed for a more refined technical package. Research on rice varieties, for both upland and swamp conditions, vegetables, and cassava is currently being carried out by the PPU.

There appears to be no scientific basis for the technical packages contained in the two Project Papers. Furthermore, after reading the paragraphs on Liberian agriculture research, there is little reason to expect a scientifically developed technical package. Probably the most trustworthy input of all the packages was the upland rice variety, LAC-23, which was developed and selected in Liberia. Rates and fertilizer formulas are stated in the Project Papers, but again with no research data to support them.

As it has turned out, the farmers are developing their own technical packages. In most instances they have found that fertilizer application at the project recommended rates does not give a beneficial financial return. They have found that fertilizing the upland rice during the second cropping season promotes more weeds. One of the major constraints to increased production is the shortage of farm labor, and increased weed problems make the labor constraint more severe.

From the Yield Survey 1979 data for Lofa County, it is clear that over just the three consecutive years that the farmers have been cultivating rice in the swamp areas, they have developed their own techniques. Farmers in their first year of operation applied 163 kilograms per hectare (kg/ha) of fertilizer (82 percent of the amount recommended), transplanted 93 percent of the cropped area, and broadcast 7 percent. In the second year of operation, farmers applied only 135 kg/ha of fertilizer (33 percent of the recommended rate), transplanted 73 percent of the cropped area, and broadcast 27 percent. In

the third year of operation, they applied only 65 kg/ha of fertilizer (33 percent of the recommended rate), transplanted 61 percent of the cropped area, and broadcast 39 percent. Even with these reductions in the amount of fertilizer applied and the increased efficiency of labor resulting from the shift from transplanting to broadcasting, the yields have apparently remained constant.

Data from the Rice Yield Analysis in Bong indicate that fertilizer application was below the recommended rate by about 29 percent in the upland rice farms and by about 21 percent in the swamp rice farms. The recommended rate was 220 pounds of both urea and triple superphosphate per acre.

The project farmers have not had sufficient time to determine what, if any, benefits there are from applying fertilizer to cocoa and coffee. During discussions at the Central Agricultural Research Institute, there was general agreement that it was not economically profitable to apply fertilizer to these crops if they were grown under shade in the partially cleared forests. The removal of the trees together with a reduction in shade and proper pruning techniques could lead to a beneficial response of coffee trees to the application of fertilizer.

III. AGRICULTURE EXTENSION

The Ministry of Agriculture is responsible for agriculture extension as well as agriculture research. It was recognized during project design that the extension service was understaffed, had insufficient on-the-job training, and lacked transport facilities. At the start of the projects, the majority of the Agriculture Extension Aides (AEAs) had had secondary education only, with some additional training at the Agricultural Extension Training Center in Monrovia. The agent/farmer ratio was over 1:1000 under the Ministry of Agriculture Extension Service.

In the project area, the number of AEAs was based on an average ratio of 1 to 50 in the first two years, increasing to 100 and 150 in the third and fourth development years, respectively. The field staff members were provided with transport and other improved conditions of service. The AEAs are given special training before they are taken on as extension aides, and are provided with specialized training on a more or less regular basis after they became full-fledged AEAs on the project staffs.

It is fortunate that the AEAs were not made responsible for the distribution of the agricultural inputs, such as fertilizer, pesticides, tools, seeds and seedlings, and sprayers.

It was recognized that the AEAs were to be information specialists who worked closely with the farmers.

The extension program in Lofa County provided a considerable amount of assistance to the swamp rice farmers during the first year of development, but the assistance level decreased rather sharply thereafter. One of the results has been a decrease in the farmers' activities related to swamp rice production. In order to be more effective, the Lofa project has instituted a "train and visit" program whereby the farmers are given more extension assistance than previously planned.

IV. SUMMARY AND CONCLUSIONS

It should have been more apparent at the design stage of the Lofa and Bong County projects that the technical package was based on little or no agricultural research findings. Unfortunately, at the end of Phase I of the Lofa project and near the end of the Bong project there appears to be no scientifically based technical package for any of the four crops to which the projects provide assistance. Generally, agricultural research takes several crop seasons to develop and test under farm conditions. There is little apparent likelihood that an improved technical package can be developed and provided to the farmers within the next five years. The chances of increased productivity remain relatively small.

The extension component of the projects can be described as a "reinvention of the wheel." The principles of a good agricultural extension project are certainly acknowledged in the extension components of the projects. It is well known that if the agent-to-farmer ratio is small enough that the agent can provide extension service to a relatively few farmers, if the agents are properly trained, if they are given good facilities with which to work which include transport and office space, then an extension component should function effectively and efficiently. In addition to these provisions, the farmers need access to credit, agricultural inputs, and markets for their produce. The projects aim to provide these services as well.

Finally, it should be recognized that the Ministry of Agriculture will not be able in the foreseeable future to assume the level of service now provided to the project farmers.

APPENDIX F

THE UPPER LOFA COUNTY AGRICULTURAL DEVELOPMENT PROJECT:
ITS IMPACT AS AN AGENT OF SOCIAL CHANGE

by Svend E. Holsoe

I. THE PURPOSE

The purpose of this appendix is to highlight some of the social change issues which have been raised by this project. There can be little doubt that the project has had an important social impact. Some of these changes have been beneficial, some possibly not so positive, and some unforeseen. As in the case of modifications which may be necessary in the technical package, some fine tuning may be necessary in shaping the social impact of the project in the future. What follows are some of the main issues which caught our attention.

II. POPULATION DENSITY

Looking at the Upper Lofa area from west to east, one finds that population densities vary considerably. In 1974, they were calculated as ranging from a high of 133.1 to a low of 58.1 persons per square mile. For the purposes of defining target populations to receive assistance from the project, these density figures became the basis for selection of certain clan groups rather than others. For instance, the Ziema area was not included even though it lay along the main road between two clans which were chosen, because, according to the 1974 census, it had a density of only 29.3 persons per square mile. What was not taken into consideration with regard to this clan and at least three others (Bunde, Faala, and Gbalein) is that considerable portions of their territories have been placed within the Government-surveyed national forests, and thus legally (if not in fact) are excluded from normal farming practices. If this had been recognized, it is probable that the densities would be in the same range as those for the other clans. The decision has caused some friction for the Lofa project, but it is being rectified in the Phase II project design.

There can be little doubt that population density plays an important role in determining the type of agricultural practices which a particular population chooses (see Boserup, 1965). If one refers to the 1974 census figures for particular clans in the Upper Lofa area, it is apparent that in those sections where the density is over 100 persons per square mile, the

farmers are the most prone to move to swamp agriculture. Thus it is in the Kissi clans of Rankoli and Tengia with population densities of 120.3 and 133.1 respectively that one finds extensive swamp rice practices. In a like manner the Bandi clan of Waoma with a population density of 121.0 per square mile has also changed from its earlier practice of shifting upland agriculture.

It is clear, however, that simple area-of-territory and size-of-population data are not the only factors involved. For instance, even though the Kissi Waum clan in 1974 had only 58.1 persons per square mile, much of their territory has through the years shifted from tropical forest to savannah, and this has had an important impact upon farming practices. Most of the upland area has become too dry to acquire an adequate re-growth of vegetation during the fallow period, and thus the upland soils do not regain sufficient nutrients for further successful cultivation. As a consequence, people have been forced to move to the swamps to grow the necessary rice for survival.

Another factor which must be considered as a newer and growing pressure upon the land is the increasing use of upland areas for tree crops. Once these lands have been planted with coffee and cocoa trees, they no longer remain available for upland rice farming.

Taking into consideration the facts that (a) the population is growing at about 3 percent per year, (b) farm households in this area consist of about 10 individuals,¹ (c) the average household upland rice farm consists of about 2.2 acres per year,² and (d) assuming that the fallow period for the area is seven years,³ we know that a household will have to have a minimum of 17.6 acres in order to continue to produce sufficient rice to feed the household for each year. Given all these factors, it should be possible to predict when farmers in a particular area will either move to the swamps to farm, or else be forced to decrease the population by outmigration (for similar calculations, see Carneiro, 1960: 229-234).

¹For the Loma of Lawalazu, Currans (1976: 356) found 9.5 persons per household, 5.4 of whom were children.

²This is probably quite a conservative figure. Currans (1979: 85-87) says the Loma average is 3-5 acres.

³In order to have a complete rejuvenation of the soil in this area, the fallow period needs to be 20 years (Currans 1979: 85).

This model has focused upon clan areas, but if one looks at particular towns, mapping the areas which belong to the towns and can be used for farming, one will find even more variation. For instance, Currens (1979) points out that the town of Fisebu has very limited areas which its townspeople may legitimately farm, whereas nearby Wozi has access to a much larger tract of land. Unfortunately, in most cases accurate mapping has not been done of the land belonging to individual towns, let alone of the clan areas.

In our travels we observed that the town of Yeila near Zorzor is in a similar situation. This town is blocked in one direction by the Guinea border, and in the opposite direction by privately held land which Zorzor townspeople have purchased along the road between the two towns. From interviews with Yeila residents, it is apparent that the annual farm yields are decreasing, food costs are rising, and many individuals must supplement what they can grow with additional purchased foods. If there was ever a town which seemed ready for a shift in agricultural practices from upland to swamp, this town is a prime example.

In order for this process to occur, it is not enough that the population be economically ready to shift. Swamps must be available which can be developed, and if the farmers are not to take a loss, the new technology must be demonstrated and reinforced over a period of time to convince the farmers that the risk is worthwhile. So far the extension service of the Lofa project has played this role well and seems to be having some success, especially now that it has instituted a new system which involves groups of farmers visiting with an extension agent the farm of one of their members and receiving on-the-spot training about actual problems as they occur.

In summary, it should be possible, based on a knowledge of the population size and the area of territory of a particular town or clan, to pinpoint prime targets for change. This would allow for a higher success rate and more efficient use of extension workers.

III. FARMING AND THE LAND

Demography is another important factor in understanding the farmers of the Upper Lofa. The original appraisal for the project stated that farm families average five persons (AID, 1975: Annex 1, 7). Based on two Farm Business Surveys (FBS) done by the project in 1977-1978 and 1978-1979, it was discovered that families averaged almost double the earlier stated size, that is 10 persons per family (LCADP, 1981:38). There is still some question whether even this new figure accurately

represents the social realities of the area. The project's questionnaire focused upon farm "families," whereas earlier research work by Currens (1976) and particularly Carter (1976) have indicated that a more useful unit of analysis is that of farm "households." A household may have at its core a man, his wife or wives, and their children, but there are many instances where additional relatives, in-laws, and various types of dependent individuals also live within the house and expect to be fed by the household head. In addition, there is considerable population mobility within each household, so that individuals constantly move from one household to another visiting kin or friends, or else move between the country and larger urban centers. Nevertheless, while resident in the household, these individuals assist in any tasks which need to be done, including farmwork.

The FBS also found that there were some important patterns which distinguished farmers who were willing to participate in project-sponsored farms from those who were not. Most of the heads of families were in their forties and had established families. These tended to be larger and to have more children than those who did not participate (LCADP, 1981: Table 38-B).⁴ It is probable that these families were finding increased pressure to obtain sufficient foods to support themselves. When the opportunity occurred to borrow the initial inputs from the project to gain increased yields or a new source of cash, these farmers found the offer sufficiently attractive to participate. This has occurred even though there may be important inadequacies in the technical package offered to farmers, as discussed elsewhere in this report, and even though farmers may not fully recognize the total cost of their indebtedness and its future economic implications.

This, of course, is not the case for all individual. For some, such as women, the project has offered a new means of gaining access to cash, particularly through tree crops. Since the project has limited the amount of area which an individual farmer may develop with project assistance, many men have chosen to increase their household-registered land by placing additional plots in the names of their children and wives. These plots, especially those held by women (and this is an important change for some groups), will allow the women to obtain cash from the sale of their crops which they then can use as they wish, usually without having to consult their husbands. For some women, particularly those whose husbands have too many other family members to worry about, this may provide either

⁴Since the survey was based on "families" rather than "households," it is difficult to know what other individuals are attached to the "family."

the necessary means of supporting themselves and their children, or it may serve as a means toward financial independence.

There is, however, a legal problem. Under traditional law, a wife married by dowry has limited rights to property in her own name. She herself is in essence the property of her husband's patrilineage, and only upon the return of her dowry and an additional "damage" fee is she released from this obligation. However, so long as a woman remains married to a member of her husband's patrilineage, she will maintain her right to the use of any farms which she has either developed herself or that are in her name. The latter is, of course, the case with plots developed with project assistance. In this sense, women gain some additional financial independence and can shape to a greater extent their personal destinies and those of their children.

Whether this new form of landholding registered in the names of women will have any impact upon future land tenure patterns, and more particularly on inheritance patterns, remains to be seen. But it is probable that since the process has now begun, women will begin to argue in time for their private ownership of the land, free from that of their husbands and their husbands' patrilineages. The pattern is already recognized for women within the statute law system of Liberia. Clearly the question raised is fundamental to the social fabric of the customary society, and it is an area that has to be reconciled.⁵

IV. INCREASE IN INCOME

The project in its survey of farm families (FBS) obtained results which seemed to be in conflict with the earlier project appraisal report. Whereas the appraisal indicated that the annual per capita cash income of farmers in the project area was \$43.00 and would at the end of the project increase to \$163.00 (AID, 1975:29), the evaluation unit of the project found that the per capita annual income was actually \$13.00 and would increase to \$47.00 (LCADP, 1981:49). Caution needs to be exercised in using the project's findings, especially since men, who in the main were the respondents to the questionnaire, generally are not aware of the cash income which their wives gain through the sale of market produce or tree crops. In addition, it is certain that there are considerable amounts of cash which individuals have and which are not normally reported,

⁵See Bledsoe's work (1980) for indications of what the future may hold when women gain financial independence.

especially in questionnaires. In particular, one thinks of funds used for supporting the sande and poro secret societies, as well as funds expended for other societies and in using the services of traditional healers. Thus, it may be possible that the earlier appraisal figures for starting incomes and final project-stimulated incomes come closer to the reality of per capita income than that indicated by the questionnaires. As a consequence, the positive financial impact for farmers may be greater than the project evaluation unit found from its survey.

V. LABOR

One topic which the project appraisal did not clearly address has been the labor demands placed upon members of farm households for various crops. There is first of all the problem of meshing farming cycles for different crops. Some earlier work by Currens (1976) has demonstrated that coffee and cocoa fit fairly well into the upland rice cycle. The swamp rice work pattern is somewhat more problematic, but can be meshed, especially if only a single crop is planted. However, as is demonstrated elsewhere in this report, in order to achieve greater economic return than with upland rice, it is necessary to double crop, and this is dependent on, among other things, the volume and continuity of water flow during the yearly seasonal cycle.

One of the statistics noted by the project evaluation unit has been the decrease in acreage of swamp rice after the initial year. A factor involved was a shortage of labor, since swamp rice is more labor intensive than upland rice. After the first year, farmers no longer received financial support from the project. Thus, it was now necessary for them to hire additional labor with their own private funds, which they often did not have.

There is also the issue of just how much time is available for farm work. A common mistake made by outside planners is to calculate the number of hours that particular farm tasks take, total these up and subtract them from the number of potential working hours, and then conclude that farmers are working well under full capacity. In addition, there has been the tendency to treat male and female labor as the same, and thus to refer to their combined work in terms of "labor units" available. A recent paper by Jenne (1981) indicates that the annual work cycle of women is considerably different from that of men. In addition, there are definite limits to the amount of labor which people within these societies see as available to them. Implicit in the peoples' perception of labor limits is their understanding that in order for a society to function there are

social binding chores in which members must engage for stability to exist. Rites of passage, adjudicative processes, and religious practices, to name a few, must be observed. These take time and cannot be sacrificed to additional farm labor without doing serious damage to the stability of the community.

Thus, in addition to land becoming an increasing constraint, labor is also a growing problem. This has been exacerbated by the increasing size of the population which is attending school and thus not doing farm work, and by outmigration, especially of males, both of which drain from farm households a considerable number of potential farm laborers. As a consequence, what one finds increasingly is an aging farming population which has considerable difficulty obtaining sufficient labor to carry on the necessary farm work.

To some extent it may be useful to view the project as a means of first stabilizing the farming communities which currently exist. However, this cannot successfully occur unless the agricultural project is coordinated with attempts to improve the quality of life in the area, such as making better health facilities readily available to farm households. In addition, in order to retain some assistance in farm work on the part of the school-age population, schools need to be structured around the farming cycle and continue to live within the farm household. There is, of course, the additional benefit that if this occurs, the children would not become as alienated from their rural backgrounds as are those who are forced to move to urban areas to obtain access to schools.

Nevertheless, the matter of sufficient labor for farm households remains a critical issue. It is particularly important to women who are unable to do certain types of farm work themselves, such as cutting bush. These individuals must find a means of obtaining cash to hire labor and, even then, in some areas it is becoming increasingly difficult to find that labor. In territories near the Republic of Guinea some households are able to obtain laborers from across the border. However, there are serious potential problems which can be anticipated, such as ethnic and national friction, as well as the possibility that the economic situation will improve sufficiently in Guinea that migrant labor may "dry up." Thus, any modifications which can be made in the project's technical package to farmers that diminishes the amount of labor required should be explored. For instance, the use of the cover legume Pereira may be a means of decreasing the need to brush as frequently under both coffee and cocoa trees, a task which, as indicated above, women must pay cash to have done.

VI. LAND TENURE

The final important issue which needs to be addressed is that of land tenure. As in the example of women's property rights under the traditional legal system versus the statute law, at least two legal systems are also operating in matters pertaining to landholding.⁶ At a time when land was a relatively abundant resource, patterns of usufruct tenure worked well. For many areas of the interior this remains the only mode of landholding. However, this system is increasingly threatened by the central Government statute law. Upper Lofa County, unlike other parts of Liberia, has been sufficiently removed from the center of financial power, Monrovia, that the pressure of freehold tenure has not been as great a problem for most farmers. This is not to say that the practice has not occurred and that there are not individual communities which find themselves increasingly constrained. Reference has already been made to the town of Yeila.

The project has taken tentative steps to recognize the potential problem. On farms begun by the project, in particular in swamp areas, the lands are first declared free and clear by the local chief and elders, and then are surveyed and simple maps are drawn. However, no demarcation with fixed monuments is made on the land itself. In addition, although a record is kept by the project office as well as by the local cooperative, the land is not officially registered under the rules of statute law. What the future holds, especially in those areas of developed land, is not clear, even though the tradition has been that the Government deeds as freehold only "unused land" which is released by the "tribal elders."

With the records it has, the project is in a position to move forward with the official registration of project farms after having the land officially surveyed. The final outcome remains to be seen, and in some senses is also dependent upon how an accommodation is reached between the traditional form of land tenure and the statute form. Certainly any basic change in the nature of land tenancy will fundamentally affect farm households and the nature of individual versus corporate property.

⁶For the larger issue of the dual systems operating in Liberian society, and the consequences therefrom, see Holsoe (1977).

VII. CONCLUSIONS

The agricultural project is set in an area and among a people who are in the process of change. The project is attempting to add to those changing patterns by providing new seeds and fertilizers. At the same time, it is modifying old farming techniques with new ones. The ultimate hope is to stimulate higher yields and access to new sources of cash income. In addition to agricultural change, some other aspects of the new social structure that is in the process of being formed can be anticipated. With attention and care, the transition can be facilitated in such ways as to cause the least disruption and dislocation. For other matters, the consequences cannot be fully known, for the variables remain to be determined.

What is certain from the Lofa project is that the Liberian staff has had the farmers as their prime concern. Good working relationships have been created among the beneficiaries, the extension workers, and the project managers. One may question whether every decision and course urged upon the farmers has been the best in all cases, but the project personnel have been flexible in their approach, either modifying the structure inherited from the original project design, or allowing the farmers themselves to make the necessary changes. The definite impression left by project staff is that these "bearers of change" do fundamentally care about the farmers with whom they are working.

APPENDIX G

INTEGRATED, AREA, AND DECENTRALIZED RURAL
DEVELOPMENT CONCEPTS

by John W. Harbeson

Confusion abounds in defining the nature and requirements of projects such as those of Lofa and Bong which are under review in this report. Clarifications are necessary if various project genres are to be fairly and accurately evaluated. The problem arises not only in distinguishing integrated, area, and decentralized development from each other but in treating one or more of these as synonymous with rural development per se. Integrated, area, and decentralized development are, moreover, overlapping concepts even when properly defined.

"Rural development" refers to the objectives and processes of promoting production and productivity in rural areas; addressing problems and processes of social change in institutions like the family, land tenure, and markets; improving productivity and the quality of life through improvements in education, health, and infrastructure; and conserving and enhancing the resource base through appropriate measures. The definition of rural development also includes objectives and processes of organizational development at the local level and their linkages to national-level bodies. Some definitions of integrated rural development confuse the "what" of rural development, such as the foregoing, with the questions of "how" to promote these objectives and influence these processes (e.g., Scudder, 1981).

Many of the "how" questions of rural development center on questions of technology, technical assistance, and organizational structures and processes. As Brinkerhoff (1981) and Cohen (1979) have observed, the basic issues surrounding integrated, area, and decentralized development are organizational. Brinkerhoff notes that the premises of integrated rural development are that the problems are complex, interrelated, and can be solved more easily by treating them in such a way that progress in addressing one aspect of the total problem can have complementary, synergistic effects on others. Integrated rural development may be regarded as an attempt to organize the implementation of a number of development inputs so that these complementarities and synergies can be realized.

Integrated rural development is similar but not necessarily synonymous with area and decentralized development. Decentralization may be essential as an organizational means to promote integrated rural development, but not all decentralized development is indeed or is intended to be integrated in the

sense of the definition proposed here. Similarly, while integrated rural development projects normally focus on a particular geographic area, such as a region or a district, not all area projects include a variety of different inputs or efforts to deliver them in an integrated fashion.

When is a decentralized, area development project also an integrated rural development project? The Lofa and Bong projects involve the creation of semi-autonomous Project Management Units (PMUs) with substantial discretion at the local level to manage processes of agricultural development and accompanying processes of social change. Clearly both were decentralized, area projects. But were they integrated? If one goes by the names, the picture is unclear concerning intentions. Bong is referred to as an integrated rural development project in the AID documentation, but not Lofa. The co-financers of the projects, the World Bank and the Government of Liberia, refer to them as county agricultural development projects. If one goes by the goal and purpose statements in the logical framework sections of the AID documentation, both appear to center in fact on agricultural development, income generation, and productivity. Neither project design identifies as an objective the organization of the numerous inputs to promote synergies and complementarities.

The projects may still be integrated in fact if not by articulated purpose. The problem is that because much of the literature confuses decentralized, area, and integrated rural development projects, the requirements for any one of the three as distinct from the others is often left unclear. What are some of the distinctive requirements of integrated rural development? Of the numerous requirements of integrated rural development identified by Brinkerhoff (1981) and Cohen (1979), the following appear to most accurately define integrated rural development: (1) sequencing of inputs, (2) provision of coordinated implementation of activities, (3) provision for linkages between project activities and those of the national government and surrounding districts, and (4) a specific plan for how to achieve such coordination, sequencing, and linkages. Of these criteria only the second appears to have been present in the planning of the Bong and Lofa projects. As indicated elsewhere in this report, for example, recognition is limited even now concerning the interdependence of several factors in promoting the health objectives which led to the inclusion of schistosomiasis surveillance and well- and latrine-building activities. PMUs were credited with the evident objective of coordinating the implementation of work done in several sectors, but such coordination has seemed to focus more in fact than by design on the requisite synergies and complementarities.

There are numbers of increasingly accepted requirements for effective rural development generally which, when met, may be particularly important in facilitating the evolution of integrated rural development projects. Among these are (1) decentralization; (2) emphasis on popular participation in the design, implementation, and modification of rural development programs; (3) the inclusion of local administrative capacity to understand the surrounding environment and act accordingly; (4) national level policy commitment; (5) effective control of and capacity to mobilize needed resources; and (6) building of organizational capacity to sustain and diffuse processes of rural development beyond the life of specific projects. Based on these criteria, both projects have the potential to become integrated rural development projects in that these requirements have been recognized. But solution of the problems implicit in these criteria remains problematical in the case of the Lofa and Bong projects.

Both projects are decentralized, though the Government of Liberia has shown some inclination to reduce the autonomy of PMUs in future years, perhaps reducing the degree of actual decentralization, perhaps not. In pressing the development of district cooperatives and town cooperative units, both projects have promoted popular participation and institutional capacity that should last beyond the life of the PMUs themselves. Whether cooperatives can in fact shoulder these responsibilities well remains an open question. Both PMUs have exhibited learning capacity (Korten, 1981), though the basic parameters of the projects cannot at this stage be modified until new project phases are negotiated. The Government of Liberia has done very well to honor its financial commitment to the projects in spite of its financial plight, but policy clarifications on matters such as cooperatives, land, and adequate crop financing have yet to be produced. Unanswered are questions such as whether reduction of project autonomy, acting on the unverified assumption that administrative costs of such projects cannot be modified with experience, and lack of progress in new national policies in key areas will undermine the effort to realize the full benefits of these potentially integrated rural development projects.

One of the most serious criticisms of integrated rural development projects (e.g., Ruttan, 1978) is that they are administratively burdensome and excessively costly. The unanswered question is whether this criticism is directed at rural development per se as Cohen (1979) suggests, at the idea of integrated rural development, or at rectifiable failures in their implementation. These questions will remain unanswered as long as more ample provision is not made for mid-course project redesign and more active efforts to learn the lessons

of old projects in the course of designing new ones. This series of impact evaluations has been one useful means of beginning to address these needs.

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funds. Although the projects continue to subsidize key staff people in the district cooperatives and instances of financial mismanagement continue to occur, the projects do seem to have made progress in improving the organizations' managerial efficiency. However, fundamental problems with the cooperative society structure remain (see Section IV.B on institution-building).

2. Evaluation and Decision-Making

If the PMUs have captured the attention of the rural poor in Lofa and Bong and formally engaged them in the projects, the technical agricultural and financial packages have proven not to be fully consonant with the material interests of the farm households, where material interests are defined in political, cultural, and social, as well as specifically economic, terms. One reason is that the project has in effect placed a disproportionate share of the risks upon farmers with little capital or labor and decreasing amounts of land to risk. Some households, therefore, which are nominally a part of the project have participated in it less than fully. To the extent that the project has not appealed to the material interests of the poor, the project may not be sustainable in the long term.¹³

At the same time, where participants have in fact responded positively to the incentives created by the projects, they have in some instances done so for reasons quite different from those of the project designers. To the extent that the poor have participated actively for reasons not understood by the project designers, the project may eventually be undermined for failure to anticipate the problems and objectives the farmers themselves see.

The story of project swamp rice development provides a prime illustration of an unsuccessful and improperly designed attempt to shift all the risk to the farmer participants. Farmers in the projects have complained of insufficient resources to hire labor needed to maintain swamp rice development, and they have objected to risking schistosomiasis and other maladies by farming in these precincts. They disagree with the Ministry of Agriculture officials who discount the importance of credit to hire laborers to maintain the banks and the canals, and the health hazards of undertaking swamp rice. It is the swamp rice farmers themselves, however, and not project or ministry officials, who take the risk that they will be unable

¹³See Appendix B by Annette Binnendijk on the farm-level project economics.